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To my dear wife, Negar
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RÉSUMÉ

L'objectif de notre thèse est d'examiner la place qu'occupe la créativité dans les technologies de l'information (TI). Nous présentons dans un premier lieu une discussion des principaux travaux qui ont traité de la créativité dans les systèmes d'information (SI). Ensuite, nous discutons de la relation entre la créativité et la technologie. Cette thèse contient trois articles, et nous présentons ici le contenu de ces articles. Dans le premier article, nous avons effectué une revue de la littérature et nous avons examiné la place de la créativité dans les systèmes d'information et positionné cette recherche à partir de la classification d'Orlikowski et Scott (2008) de la variance, des processus et de la relationalité. Nous avons situé la littérature sur la créativité dans la recherche SI dans une logique de variance et nous avons proposé d'élargir la recherche en étudiant cette relation dans une logique de processus sociaux. Dans le second article, nous nous sommes concentrés sur l'impact des technologies sur la créativité et nous avons mené une étude ethnographique sur un festival à Québec. La contribution de cette article consiste à voir cet impact comme transmissif, interactif et imaginatif. Dans le troisième article, nous nous sommes concentrés sur l'impact de la créativité sur l'utilisation de la technologie et nous avons mené une recherche qualitative dans le secteur de la radio à Montréal. La contribution de cet article est de montrer l'importance de la créativité dans l'usage des systèmes d'information. L'objectif général de cette thèse est d'étendre la connaissance scientifique et pratique en ce qui concerne les SI et la relation entre la créativité et la technologie à partir de la logique du processus social.

Mots clés : technologies, créativité, processus, acteurs, industries créatives, usage de technologie.

ABSTRACT

The goal of this research is to examine the place of creativity in information technology (IT) research. We examined research on creativity in the information systems (IS) discipline and discussed the relationship between creativity and technology. The thesis contains three articles, the summary of which is as follows: In the first article, we conducted a literature review and examined the place of creativity in IT research, positioning this research on the basis of Orlikowski and Scott's (2008) classification of variance, process, and relationality. We positioned the creativity literature in IT research under variance logic and we proposed avenues of research to study this relationship by adopting social process logic. In the second article, we focused on the impact of technology on creativity and conducted an ethnographic study on a festival in Quebec City (*Carnaval du Québec)*, discussing this relation under transmissive, interactive, and imaginative categories. In the third article, we focused on the impact of creativity on the use of technology and conducted a qualitative research study on the radio industry in Montreal; we discussed creativity under two themes that play important roles in the use of technology and showed the importance of creativity in this context. The general goal of this thesis is to extend research on the relationship between creativity and technology from the point of view of social process logic in the IS discipline.

Key words: Technology, creativity, social process, actors, creative industries, technology-in-use.

INTRODUCTION

Due to its undisputable relevance to individuals, organizations and societies, the concept of creativity has been widely discussed over the last decades in a variety of social science disciplines. It is understood that creativity is the means for, if not the engine of, renewal and a vital source for the firm's competitive advantage. While other disciplines have dedicated entire journals (e.g. *Creativity Research Journal*, *Journal of Creative Behavior*, etc.) to creativity and its related research areas including both theoretical and empirical studies, it is apparent that the information systems (IS) discipline—here we also include information technology (IT), or technology—has paid relatively little attention to studies related to creativity. In other words, there has been a paucity of research aimed at specifying the relationship between creativity and IS.

This dissertation, conducted in three separate essays, focuses on the relationship between creativity and information systems by pushing the boundaries of earlier studies of creativity in IS as well as identifying future avenues of research. In addition, we extended the understanding of the creativity–technology relationship by investigating it in the context of creative industries with the help of qualitative research.

Over the past three decades, there have been few attempts in the IS discipline to present a literature review on the place that creativity occupies. The first study was conducted in the early 1990s by Couger et al. (1993); they conducted an extensive investigation in order to understand the place of creativity, and presented two research approaches for discussing creativity: 1) an *origin-oriented approach*, and 2) a *process-oriented approach*. In the first approach, creativity arises from the

conflicts within an individual where the creative process involves externalization of the internal product of imagination via the interaction of primitive and more mature types of thinking. The second, or process-oriented approach, reveals that an individual's creativity is a function of his or her ability to invoke and explore remote associations in selecting a response to a problem. This study and its successors (Seidel, Muller-Wienbergen, and Becker 2010, Tiwana and Ephraim 2005) highlighted the importance of creativity in the IS field. However, creativity has been a neglected concept within the IS discipline, and moreover, there is in particular a lack of empirical evidence in qualitative studies associated with the creativity concept.

This dissertation focuses on the place of creativity in the IS discipline and extends this understanding to the relationship between creativity and technology. The dissertation project has been designed through the integration of three articles in order to explore three main research questions. We present clear research questions not only to help explain the motivation behind the study but also to provide a framework for making decisions about data collection and analysis (Phillips and Hardy 2002).

In our first article, we examined the place of creativity in the IS discipline; we aimed to understand the approach towards the relation between creativity and technology, and we positioned the existing literature based on the Orlikowski and Scott (2008) classification. The following question was the main driver of this thesis and was developed in Article 1: *What is the place of creativity in the IS discipline and under which logic has the relationship between technology and creativity been studied?*

In the second article, we examined: *What are the impacts of technology on creativity?* This question reveals basic assumptions that are held about the definitions of technology and creativity. We considered technology and creativity as socially constructed, and the impact of technology on creativity follows a process over time. The literature reveals that technology has been mainly considered a facilitator of

creativity. We also extended our research to examine the hindering impacts of technology on creativity. We grounded our research on an empirical study that combines an ethnographic study spanning two months with interviews and filming before, during, and after a festival.

In the third article, we asked: *What are the impacts of creativity on technology use?* The basic assumptions we hold about organizational phenomena are: 1) Technologies are not taken for granted but their use is socially constructed over time; each choice of use and way of use reflects social issues in the organization; 2) Different people interpret technologies and the use of technologies differently; 3) We also draw upon the concept of absorptive capacity to understand the impacts of creativity in the use of technology while considering that this requires integrating expertise to accomplish creative work. We grounded our research on a retrospective, in-depth case study with interviews spanning over two years.

Key Contributions of the Thesis

In this section, we highlight the specific contributions of each article along with other practical implications of the dissertation. The articulation among the research questions and the papers are shown in Table 1.

Table 1: Thesis, the articulation of three papers

Article I	Article II	Article III
Subject of research: New research trends relating technology to creativity as social processes	Subject of research: Technology for creativity: transmissive and interactive in the experience of a cultural festival in Quebec	Subject of research: Creating-in-technology from a technology-in-use perspective: case study in the radio industry
Main contribution: Discuss the existing literature in IS on creativity. Position this literature, and identify the existing gap, and propose extension to study IS-Creativity under social process.	Main contribution: Classify the existing literature on the impact of technology on creativity in IS discipline; extend the literature on this impact from social process logic by conducting a qualitative empirical study.	Main contribution: Understand the impact of creativity on technology-in-use from social process logic using the case study highlighting the importance of the "absorptive capacity" of the actors in their use of technology

Summary of Article I: Research Trends on Creativity-Technology: Connecting Technology to Creativity as Social Process

In the first article, we capitalized on an extensive literature review regarding the position of creativity in the IS discipline and positioned this literature under the variance logic proposed by Orlikowski and Scott (2008) as well as the more general management or social science studies of creativity. We conducted an in-depth literature review in order to study this relation from the perspective of social process logic. Our contribution is twofold: First, we have positioned the existing literature and second, we have extended the discussion on the relationship between creativity and technology to include social process logic. In this vein, we discuss the impact that creativity has on technology use, and also the impact that technology has on creativity from the social process perspective.

Summary of Article II: Technology for Creativity: Transmissive, Interactive, and Imaginative Technological Impacts on the Creativity Process

In the second article, we conducted an empirical study in order to understand the impact of technology on creativity using an ethnographic study on an open-air festival in Quebec City, Canada. Our contribution classified the existing literature regarding the impact of technology on creativity under the categories of *transmissive* and *interactive*. Second, we extended our analysis under the social process logic to examine this impact using a case study. Based on our analysis, and in addition to earlier classifications, we identified another category called *imaginative*.

Summary of Article III: The Impact of Creativity on Technology Use: The Case of Radio

In the third article, we conducted an empirical study in order to understand the impact of creativity on the use of technology (or technology use) by conducting retrospective, qualitative research at a radio company in Montreal, Canada. Our contribution underlines two theses of technology use as an impact on creativity. Our article has been submitted to the Special Issue: Creative Industries in the *Journal of Business Research* (JBR), following the presentation of a preliminary article at 3rd INTERREG conference on "*Creative Industries: Think tanks for innovative practices in management, strategy and organization?*" held in Deauville on November 7-8th 2013.

Other Practical Contributions

In addition to academic contributions, we extended the knowledge to the practical field. This dissertation yields a better understanding of how managers can implement processes in their organizations and use the creativity of individuals for the advancement of their projects. We discuss the fact that in each organization, there is no predetermined factor that determines how creative work can happen and how individuals can use technology to create novelty. In addition, we discuss the deliberate use of technology for the creative work to develop itself. Moreover, it draws attention on information systems by opening reflections, discussions and negotiations around the concept of creativity and extending the understanding on how IS can have an impact on creativity of individuals and organizations. We aimed to enhance the understanding of managers and CTOs (Chief Technology Officers) on how to create an atmosphere in the company that fosters initiation and support for creative work.

Ethical Issues of Research Involving Humans

This research respected all requirements established by TELUQ University's Ethical board, including guidelines for informed consent, participant consent forms and research ethics protocols. The signed versions of each consent forms by each individual who participated in this research are available upon request.

Dissertation Plan

The dissertation is structured as follows: After this introduction, we present an extensive literature review on technology and creativity as different concepts. We present different epistemological approaches for these concepts. We also present the context of this dissertation as creative industries. Secondly, we present the extensive methodology and data collection we have used for this dissertation. Following these two chapters, we present the articles I and II and III successively. The article I is single authored (by myself), while articles II and II are co-authored by myself and the supervisors. Finally, we present the discussion, conclusions, including practical implications and we also present potential research avenues together with limitations of this dissertation.

CHAPTER I

TECHNOLOGY AND CREATIVITY: TRENDS AND EPISTEMOLOGIES

1.1 Introduction

We consider that IS, whether at their early stages of implementation, use or towards the end of the process, with impacts, are not pre-determined and the reactions are socially constructed over a given period of time. Second, each individual in the society or in the organization considers and interprets IS differently. It might be the case that individuals have some assumptions which are identical, but when it comes to IS use, and receiving impacts from IS, or to interpret them, individuals and groups in the organization take different decisions and these decisions are unique, and shared on a different basis from one individual or group of individuals to the other.

On the other hand, we hold certain assumptions regarding the impact of IS, which could be only understood over the course of time. The studies on IS have undergone tremendous changes from acceptance to use; adoption and adaptation and the influence of human-machine interaction have been given significant attention in the literature. This highlights unpredictable results on the use of IS in organizations which differs from one another and from one stream of research to another. The pattern of use and impact of IS in the organizations has been widely studied in organization. The process *(processual)* mechanism of use of IS in the organization present different tendencies on the outcomes and resulting impacts in the organization which are context-dependent.

On the other hand, creativity studies also present different trends and epistemological grounds. Creativity also has been studied from the individual, to the group and organization, and from the individual to the social perspective.

In this chapter, we discuss various philosophical perspectives (paradigms and epistemologies) towards IS and creativity as separate entities and we discuss how scholars considered these two concepts, defined them and used them in various empirical researches. Following this brief introduction, we present the trends of technology studies and discuss different philosophical perspectives given in information systems. This implies different epistemological grounds given to IS, which enables different visions towards IS, its implementation and its use by individuals in the organization. Second, we present the different trends and definitions towards creativity as means of creating something novel and we present the trend of creativity from the individual to the social. Third, we briefly present the difference between creativity and innovation, and finally, we present the creative industries as the context for our empirical papers.

1.2 From Technology Determinism to Human Agency

With every new introduction of technology, researchers tried to provide theories about how technology and human can form organizational structures, processes and outcomes. Over the last few decades, different perspectives have been developed on the role of technology. In order to study technology, several epistemological perspectives have been used to constitute valid research. One of these is Hirschheim (1985), where he considers that in IS there are four stages of historical perspectives referred to as: 1) the arrival and positivist, 2) emerging anti-positivism, 3) re-entering of positivism (through logical positivism and finally 4) the arrival of contemporary critics. In this dissertation, we conducted qualitative research and according to Guba

and Lincoln (1994), there are four paradigms of qualitative research known as positivism, post-positivism, critical theory and constructivism. However, other scholars like Orlikowski and Baroudi (1991) suggest three categories of IS epistemology paradigms, known as positivist, interpretative and critical. In the next sub-section, we present the main discussions attached to these paradigms.

1.2.1 Technology Determinism

In early studies of technology and organization, the assumption was that technology is an exogenous and relatively autonomous force that can drive organizational change. As technology is stable, it has significant and predictable impacts on organization and human practices, such as governance structure, work routines , information flaws and performances (Brynjolfsson and Hitt 1995). This stream was developed mostly in the 70's where technological advances started to change the face of organizations (Winner 1977). According to this view, technology is hardware which is distinct from human and organization and can directly impact human behaviour and organizational characteristics.

Many researchers followed this stream of research to find relationships between technology and organization in a way that technology characteristics and types can predict organizational elements (Markus and Robey 1988). The framing of technology as an engine of change (Markus and Robey 1988), and causal determinant of organizational elements is the foundation of the literature based on the contingency theory. Contingency- based studies have argued that situational factors interact with technology to cause outcomes (DeSanctis and Poole 1994). The commitment of contingency theories to study the powerful effect of technology on organizations and people contributed to the development of a more moderate technological determinism perspective (DeSanctis and Poole 1994). These studies of technology determinism followed a positivist approach in order to find generalizable rules from statistical

analysis and empirical studies (Markus and Silver 2008). Therefore, they looked at patterns of impact across various technologies and organizations, so that they can determine predictable impacts and effects of technology. For example, these studies are interested in seeing how the use of media such as audio, video and email can facilitate communication in virtual teams based on different contingencies such as team size, demographics, or mutual understanding (Katz and Te'eni 2007). These studies have several limitations which have led to the emergence of human agency and other approaches towards technology.

1.2.2 Human Agency and Emergent Approach

The interest and importance of explaining information technology's organizational consequences, and challenging the role of technology as the main determinant of change in organizations, has led increasingly to studies that privilege the human role over social structures and technological features (Boudreau and Robey 2005, Orlikowski 2000). In the strongest versions of this view, only human agency can properly be thought of as an explanation for social phenomena (Markus and Silver 2008).

A human agency view suggests that humans are relatively free to enact technology in different ways. In contrast to technological determinism contention, humans can use technology minimally or maximally, individually or collectively, and improvise it in ways that produce new and unexpected consequences (Boudreau and Robey 2005). Therefore, technology is not the determinant of social change; rather it is implicated in organizing through the discretion of human agents (Orlikowski and Barley 2001). In these theories, human actions are central, particularly those associated with embedding structures within a technology during its development (socially-embedded structures) and the actions associated with appropriating those structures during the use of technology (Orlikowski 2000). There have been several theoretical

developments in this trend. These developments have led to emergent approaches that consider the interaction between technology and human agency in organizing and structure.

The 1990s is a period of significant advancement for interpretativist theories of organizational change, despite the fact that positivist views were dominating the research. In particular, the structuration view developed by Giddens (1984) was expanded extensively to technology research. These theories have been based on intellectual tradition of social construction, saying that technology is shaped through its cultural meaning and social interactions among relevant social groups. Central to this view is the assumption that understanding of technology is neither fixed nor universal, but emerges from situated and reciprocal processes of interpreting and interacting with particular technologies over a period of time (Orlikowski 2010). This emergent process perspective focuses primarily on the embedded and dynamic meanings, interests, and activities that are seen to provide an ensemble of technological relations (Markus and Robey 1988). Studies based on this perspective tried to examine how the particular interest and situated actions of multiple social groups shaped the signs, meanings and uses of new technology over the course of time. Studies of this view have roots given by the constructionist studies elaborated in the next sub-section.

1.2.2.1 Social Construction Studies

Since the beginning of 1990, the new way of seeing the organization is based on social construction approaches. Berger and Luckman in their famous book on the Social Construction of Reality (1967) has started the new way of looking at reality as based on social construction rather than something fixed or pre-described. By the 1980s, Giddens (1987a) with his structuration theory of society has given a new turning point in this field.

Importantly, social construction is not a theory that could be applied to an organization; it has roots from social science and philosophy (Pinch and Bijker 1984). Social construction proposes a new look at the nature of science and also of reality (Le Moigne 1995). According to the social construction point of view, the scientific reality is plural and is constructed socially with interactions between individuals and the object. Simultaneously, these social interactions take into consideration the historical, a priori beliefs of the individuals. In other words, reality does not exist by itself; it is the result of human work in a social environment. On the other hand, the social construction point of view makes it possible for researchers to look at the world differently, and muse on the social reality of the organization rather than the reality by itself.

As mentioned, the social construction view requires a pre-construction based on the history, and the a priori beliefs of the individuals. Kimberly and Bouchiki in their article (1995) present a set of influential factors, internal or external, based on the important place of the past.

On the other hand, social construction gives an important place to the individual, and the actions of the individual within the organization. At the same time, the action is within a particular context which is by itself associated with the organization and the environment in which the organization is present. This rejoins the fact that not all identical actions/interactions in various organizations will lead to the same result. In other words, actions might be the same in two organizations but the result might differ due to the intention of individuals, their interactions, and the context in which the action is taking place.

Bouchiki (1998) believes that the behavior of individuals in the organization is complex, multi – directional and in some cases contradictory. He believes that an organization is a social space continuously torn by its members in multiple and contradictory directions. According to Bouchiki, the organization is viewed as

puzzled tensions in the behaviour of individuals, for example between integration behaviour and differentiation behaviour, between innovation and conservation etc. At the same time, in the social construction approach, individuals are considered to have the capacity to learn from their actions and the notion of experience, familiarity and acquiring knowledge based on experience become important. On the other hand, the individuals are considered as reflective on what they are doing, and they can question themselves on what they are doing in their daily lives based on their experience, history and the context in which they are doing their job.

Based on this, the individuals construct the reality for themselves. The social construction considers that reality could be deconstructed with the mindset of reconstructing it. This means that the individuals deconstruct what they have constructed in the view of reconstructing the reality based on the events that have taken place recently or to stabilize the social reality.

In summary, the foundation of social construction considers that: - the scientific reality does not exist by itself; it is the result of various interpretations and interactions between the researcher and the object in a social environment. – The reality is not prescribed, or something that is given a priori; rather, it is the result of human social activity. – The individual is considered as a reflective actor, who has experiences and historical backgrounds.

The action and the structure in which the action is taking place have an important place in the social construction of the facts. Giddens (1987b) has illustrated this position. According to Giddens (1987b), individuals are competent actors in the social environment. At the same time, they have a reflective capacity and social knowledge which regroups their competencies. Their social competencies are expressed in the way they communicate. On the other hand, they are capable of

observing and understanding what they do while they are doing the action. They are also able to theorize their actions or the actions of their peers (Rouleau 2007).

In the 1990s, the structuration theory penetrates in different branches of management (strategy, innovation and technology). In IS for example, one of the main authors is Orlikowski; she takes into consideration to re-conceptualize technology like a structure with its objective and subjective characteristics (Orlikowski 1992). Later in the 2000s, she considers technology in the practice of its users, i.e. in the way that individuals use the technology and appropriate it over time. (Orlikowski 2000, 2002).

1.3 Creativity Studies: Definitions

Creativity like technology has been studied from various epistemological perspectives; however, before elaborating on different epistemologies of creativity, we need to understand the definitions attached to creativity. In other words, we must understand what we mean by creativity. Formulating its definition is difficult. Many authors, from various disciplines in human sciences, have examined the notion and definition of creativity. For example Storr (1972) has defined creativity as "the ability to bring something new into existence". In the same vein and along the lines of this definition, Harth and Kosslyn (Harth 1993, Kosslyn 1983) defined creativity as 'the ability to contemplate something that has never existed before'.

As mentioned earlier, in the literature, creativity has been studied from different perspectives and it has been associated with various definitions. For example, Unsworth (2001) has mentioned that:

> *'these perspectives range from Rocye's discussion of inventions in 1989 to Guilford's call for creativity research in 1950; research into creativity in*

classrooms to research into creativity in organizations and Freudian accounts to cognitive accounts; personality accounts, sociological accounts, interactionist accounts and psychological accounts'.

Slavich (2010) has conducted an extensive literature review to understand the breadth of definitions of creativity in the literature. His literature review, which was conducted through content analysis from Business Source Complete , conducted over 18 years, from 1990 to 2008, analysed over 462 articles in academic journals and 50 books, including top journals such as *The Academy of Management Journal*, *The Academy of Management Review*, *Administrative Science*, *Creativity and Management*, *Creativity Research Journal* and *Organization Science*. He found 94 definitions of creativity and constructs that represent this concept. At the end of his analysis, six conceptual categories were identified as representative (definitions) for creativity: Creation, Engagement, Interaction, Modification, Outcome and Synthesis (see Table 2).

Table 2: Synthesis of creativity definitions (Slavich, 2010)

Primary Construct	Other common constructs
Creation	Production, development, generation, materialization, imprvisation, acheivement
Engagement	Total involvement
Interaction	Communication, social process, collaboration, influence, working together
Modification	Transformation, change
Synthesis	Thought, imagination, knowledge, problem solving, improvement, discovery, intuition, invention, conceptualization

Based on his analysis, conducted with coding and the use of NviVo software, 39% of definitions of creativity refer to outcome, 32% refer to synthesis, 19% to creation, 5% to modification, 3% to interaction and 2% to engagement. Appendix 1 refers to Definitions of creativity and its conceptual categories.

1.3.1 From Personal Creativity to Social Creativity

Initially some scholars have discussed creativity as related to individuals' set of characteristics (Barron and Harrington 1981) .However, over the last three decades, scholars' attention has been moved from internal (individual) to external (contextual) characteristics of creativity. Many scholars (Amabile 1988, Oldham and Cummings 1996, Ford and Gioia 1995b, Shalley 1991) have examined how environmental characteristics affect creativity at work and how such environmental characteristics can facilitate or impede creativity. In this subsection, we elaborate on various types of creativity.

1.3.1.1 Organizational creativity

Davis and Scase (2000) discuss organizational creativity in length. They mention that for an organization to have creativity there should be three key dimensions respected : autonomy, nonconformity, and indeterminacy. By autonomy, they mean that individuals should occupy broadly defined work roles which allow them to experiment and exercise relatively independent judgments in how they execute their tasks and fulfill organizational objectives. By nonconformity, they mean a certain culture within the organization, which in their view contrasts with bureaucratic organizations; this encourages employees to undertake their tasks and pursue their goals in often different and unusual ways. The third element is indeterminacy, which refers to the extent to which employees not only enjoy relative independence and autonomy but how the achievement of organizational goals is translated into operational practice.

In the same vein, Woodman and Sawyer (1993) developed a theoretical framework for understanding creativity in complex social settings, identifying both social influences and contextual factors. They have taken an interactionist approach, integrating process, product, person and place (e.g. environment) factors in developing a comprehensive organizational creativity (Mumford, Hunter, and Bedell-

Avers 2008). Woodman and Sawyer (1993) present three propositions that explain the prediction of creativity at the individual, group, and organizational level (Mumford, Hunter, and Bedell-Avers 2008);

Individual level: individual creativity is a function of individual characteristics, social influences, and contextual influences.

Group-level: creativity is a function of individual Creativity of group members, and of group and contextual characteristics.

Organizational-level: creativity is a function of group Creativity and organizational characteristics.

1.3.1.2 Functional Creativity

The functional creativity approach puts emphasis on the evaluation and exploration of creativity (Mumford, Hunter, and Bedell-Avers 2008, Cropley and Cropley 2005). Functional creativity argues that most definitions and measurements of creativity overemphasize the aesthetic aspects of creativity. Indeed, most creativity tests or measured products involve wordplay, collages, poetry, and similar exercises. Yet for domains that must create a workable product (as in organizations), the relevance and effectiveness of a product are key considerations (Mumford, Hunter, and Bedell-Avers 2008, Cropley and Cropley 2005). If we look at creativity from an engineering perspective, the majority of discussions about creativity is without functional manifestation, or functional purpose, whereas for engineering creativity, it is the result with purpose which counts (Kaufman and Baer 2005). They also link creativity to "good engineering" (Kaufman and Baer 2005).

1.3.1.3 The 4-Ps Model of Creativity

Amabile (Amabile 1997, Amabile 1988, Amabile et al. 1996) provided the 4-Ps model of creativity which represents creativity as a dynamic phenomenon comprised of four highly interactive components: *Person, Process, Produce and Place (Press, Creative environment).* A considerable number of researchers, in particular Ackoff (1981), have worked on the *creative individuals (Creative Persons*). Research demonstrates that creativity is present in everyone (Couger, Higgins, and McIntyre 1993), however fewer people use it.

Ackoff and Vegara (1981) in their famous article of 1981 present two approaches to the nature of creativity, from The Origin Oriented Approach to The Process-Oriented Approach; under *origin-oriented approach*, they consider it from the point of view of:

1) *Psychoanalysts:* Creativity arises from conflicts within an individual. The creative process involves externalizing the internal products of imagination through the interaction of primitive and more mature types of thinking (Freud 1970).
2) *Humanistic Psychologists:* Creativity arises when there is no conflict within an individual. The creative process involves the release of a natural creative potential through the removal of inhibitions from the individual and obstructions from his or her environment (Fromm 1959).
3) *Psycho-metricians:* Each individual's natural creative potentials are limited by his or her genetic endowment and can be measured by standard tests. The creative process involves the interaction of two contrasting types of thinking: divergent, which converts information into a variety of unconventional alternatives, and convergent, which aims at unique or conventional outcomes (Guilford 1950).

Under *Process-Oriented approach*;

1) *Associationnists*: An individual's creativity is a function of his or her ability to invoke and explore remote associations in selecting a response to a problem (Mednick 1962).
2) *Gestalt Psychologists*: Creative thinking proceeds neither by piecemeal logical operations nor by disconnected associations by more determinate restricting of the whole situation (Wertheimer 1959).
3) *Cognitive Science Theorist:* The human thinking process can be simulated as the process of information processing in computer programs. Creative activity is a special class of problem-solving activity characterized by novelty, unconventionality, persistence, and difficulty in formulation (Newell, and Shaw 1972).

As for the second P; the *Creative Process*: One of the earliest theorist, Wallas (1926), anchored his notion of creativity in the very process of creation itself, by postulating a series of four steps: preparation (gathering of information, thinking about the problem, and coming up with possible solutions); incubation (the setting aside of the problem from conscious active thinking, and allowing the issue to ferment); illumination (the "Aha!" experience, which is the point at which everything comes together and the solution is clear); and verification (the solution is checked for feasibility, effectiveness, practicality, and appropriateness). Drazin and Glynn (1999) consider the process orientation of creativity, as creativity is the process of engagement in creative acts, regardless of whether the resultant outcomes are novel, useful or creative (Watson 2007). By utilizing the approaches that facilitate the creative process, people can enhance their creative abilities and therefore creative results (Couger, Higgins, and McIntyre 1993).

The third P: the *Created product*: the major theme is the product perspective. This vision of creativity focuses on the outcomes of creative activity: new ideas, models, scientific theories, artistic works, performances, and other kinds of outputs (Sternberg 1988) .

Taylor and Getzels (2007) identified creativity as new content, such as new scientific theory or a literary novel. This theme has been one that has perhaps generated the most agreement and added some additional conditions and has defined creative work as original and purposeful on the part of the creative individual. Amabile (1997) considers creativity as simply the production of novel and appropriate ideas in any real human activity. She uses the social psychology of creativity in her study setting (Watson 2007). At the same time, Ford and Gioia (1995a) consider a combination of product and persuasion orientation to creativity, where they mention that creativity is domain specific, subjective judgement of the novelty and value of an outcome of a particular action (Watson 2007). Along the same line of thought, King (1995) considers that work Creativity is seen as the process by which an individual produces a novel and appropriate solution to a work-related problem. King (1995) takes into account both product and process orientation. On the other hand, an analysis of Creativity can also start with the end product, by identifying the characteristics necessary for objects to be classified as creative (Morgan 1923, Couger, Higgins, and McIntyre 1993).

Finally, the fourth P is: *Place or Creative Environment*; it is the relationship between human being and environment and how the environment influences Creativity (Amabile 1988, Cummings 1965, Couger, Higgins, and McIntyre 1993).

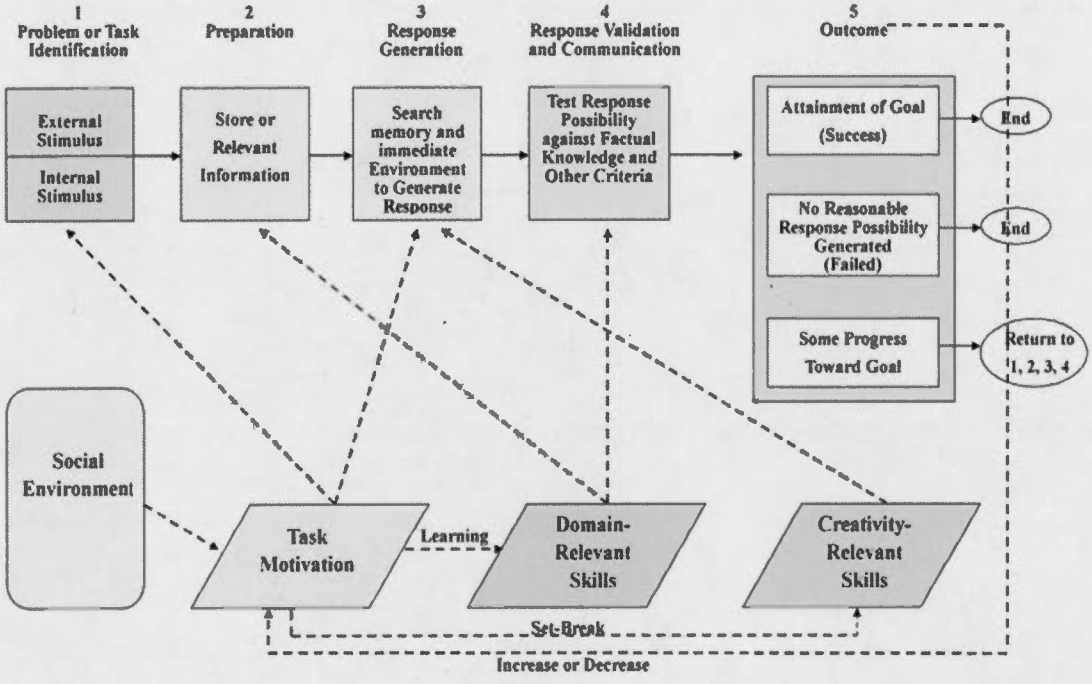
Similar to the 4-Ps model of creativity, Plucker (2004) proposes a definition of creativity that takes into account the concepts of person, place, process, and product: "creativity is the interaction among aptitude, process, and environment by which an individual or group produces a perceptible product that is both novel and useful as defined within a social context". In other words, creativity is the how (ability and process) and the where and when (environment) made by the who (individual or group) making the what (a specific product both new and useful). This is very close to Amabile's 4-Ps. Although perhaps too general to provide precise guidance to researchers and practitioners, such a definition magnificently articulates the complex

and comprehensive nature of creativity and the multi-level considerations inherent in the construct itself (Mumford, Hunter, and Bedell-Avers 2008).

1.3.1.4 Social Creativity

There have been various researches that discuss the social and contextual side of creativity. The very first scholar who developed a model within a social context was Amabile (Kuo 2011), *Componential Model of Creativity* in 1983 (Amabile 1983). This model can be mentioned as the first one to consider the cognitive, personality, motivation and social influences in the creative process. In Amabile (Amabile et al. 1996, Amabile 1983), creativity is the creative product that emerges in a five step process 1) problem or task identification; 2) preparation; 3) response generation; 4) response validation; and 5) outcome evaluation. Furthermore, the process interacts with task motivation, domain-relevant skills, and creativity relevant skills. Figure 1 below illustrates Amabile's Componential Model of Social Creativity.

Figure 1: Componential Model of Social Creativity (Amabile, 1983)

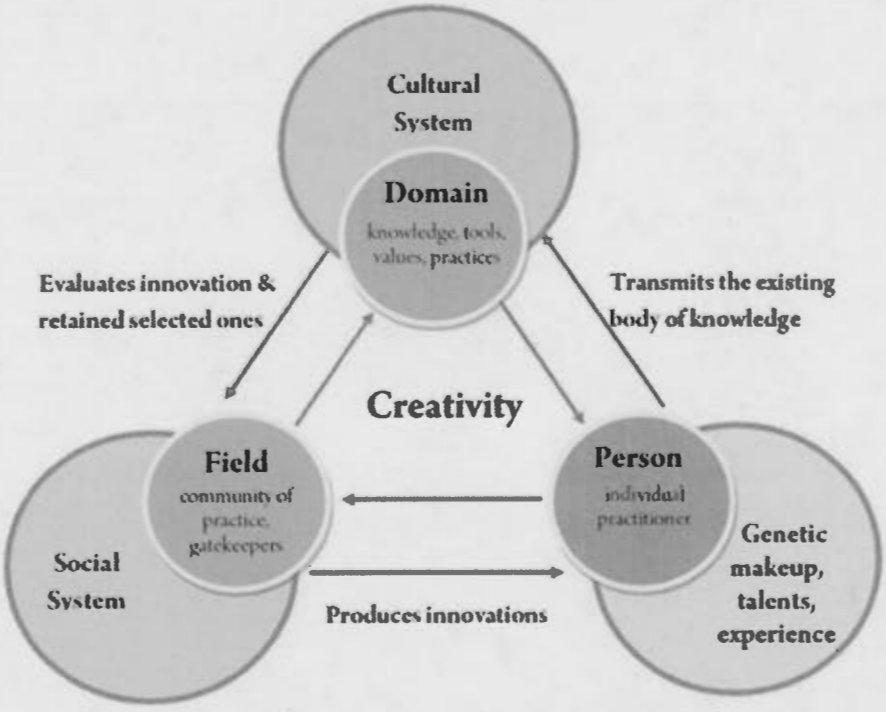


Another attempt to discuss the social context of creativity was elaborated by Ciskszentmihalyi, who investigated the relationship between creativity and cultural evolution (Kuo 2011). Inspired by the process of species evolution, Ciskszentmihalyi developed the DIFI framework in 1988 (Kuo 2011, Csikszentmihalyi 1998). This framework contains three sub-systems; I: Individual; F: Field; I: Interaction.

Furthermore, Ciskszentmihalyi revises the framework and names it *System Model of Creativity* in 1999 (Kuo 2011), according to the model, creativity can be best understood as the confluence of three sub-systems . In his social model of creativity, the individual is the most important one from the psychological perspective (Kuo 2011). An individual makes a novel variation in the contents of domain and the variation will be evaluated by the second part of the system, which is the field (Kuo 2011). The fields are held by various gatekeepers, such as experts and scholars, who

have the right to choose which variations can be reserved in the domains (Kuo 2011). The creation by an individual must be sanctioned by a group of some sorts group entitled to make decisions as to what should or should not be included in the domain (Kuo 2011). Figure 2 below illustrates Csikszentmihalyi's *Systems Model of Creativity*.

Figure 2: Ciskszentmihalyi's Social Model of Creativity (Csikszentmihalyi, 1998)



Another attempt to discuss the social context of creativity is Strenberg and Lubart's *Investment Theory of Creativity* in 1991 (Kuo 2011, Sternberg and Lubart 1991). Unlike researchers like Csikszentmihalyi or Amabile who focus on describing the subsystems and its interactions, Sternberg and Lubart have investigated the different factors that might influence creativity (Kuo 2011). To them, creative people are those willing and able to "buy low and sell high" in the realm of ideas (Kuo 2011). Sternberg (2006) explains that buying low means pursuing ideas that are unknown or out of taste but have growth potential (Kuo 2011). To Sternberg, creativity is a

decision making process or choice which relies on analytic, creative thinking and practical skills(Kuo 2011). In the creative process, the investigator needs to take the risk, overcome obstacles, and have tolerance of ambiguity (Kuo 2011). They assert that the creative performance or products rely on many factors that may be well-known (Kuo 2011). In the *Investment Theory of Creativity*, the production of creativity requires the assistance of combinations of divergent elements, such as intellectual abilities, knowledge, thinking styles, personality, motivation, and environment (Sternberg and Lubart 1991, Sternberg 1988, Kuo 2011).

1.3.2 Paradigms towards Creativity: He-Paradigm, I- Paradigm and We-Paradigm

According to Glăveanu (2010), the study of creativity has known three paradigmatic stages: The genius stage (He-Paradigm), the creative person (The I-Paradigm) and the social stage (The We-Paradigm).

He-Paradigm, the Lone Genius: takes into consideration the strongest individualistic stand in the conceptualization of creativity. It is based on the individuality, insight, outstanding ability and fertility of genius as elitist and essentialist account of creativity. It is considered that creativity is given by God.

I-Paradigm, the Creative Person: It considers that everyone can be creative while replacing the genius with a normal person.

We-Paradigm, Social Psychology of Creativity: It considers that creativity takes place within, is constituted and influenced by and has consequences on social context. Creativity is connected with creative production, a creative person, a field (social system) and a domain (system of symbols).

1.4 Distinction between Creativity and Innovation

There is an important variability in defining creativity and innovation. The terms innovation and creativity have often been defined with ambiguity in the literature. Both terms incorporate novel ideas and novel ways, processes or characteristics, however these two concepts are not the same. Many authors consider creativity as generation of new and novel ideas and innovation as the application of these new ideas (Amabile 1988, Van de Ven 1986). For example, Amabile et al.(1996) consider that: '[...] all innovations begin with creative ideas.

We define innovation as the successful implementation of creative ideas within an organization. In this view, creativity by individuals and teams is a starting point for innovation; the first is necessary but not a sufficient condition for the second'. Chouteau and Viévard (2007) mention the word creativity, as synonymous to *inventivité*. They actually borrow this word from Louis Armand who introduced it in 1970. In the same vein, Amabile (1988), defines creativity: 'A product or idea is creative to the extent that it is both a novel and appropriate response to an open-ended task.' (An open-ended task is one that does not have a clear and straightforward path to salutation. On the contrary, Amabile (1988), also suggests that 'innovation is the successful implementation of creative ideas about products or processes within an organization ... The products and processes can range from management ideas to manufacturing methods'. Therefore, it is important to consider that behind (most but not all) every innovation, there is creativity or *inventivité*. The same thing happens in the industry; as an example, Leonardo Da Vinci had the creativity or idea of the flying back in 1500. This idea became an invention by The Wright brothers in 1903, but only in 1918 did the idea – invention became an innovation by US Air Mail. Table 3 below illustrates different dimensions of creativity and innovation with respect to various sub-themes.

Table 3: Difference between Creativity and Innovation

Creativity		Innovation	
	Novelty and Usefulness Described as something new and useful to an individual or society (Amabile 1988; Nemeth and Nemeth 2001). Use or value is interpreted differently by different disciplines		Novelty Absolute or relative to the unit or organization (Amabile 1988)
	Big and Small Creativity Pertains to outstanding achievements that cross disciplines and epochs, term Big C or breaking through creativity (Csikszentmihalyi 1999, Feldman 1999). It can be also manifest itself as everyday achievement or lesser magnitude at the individual level, sometimes to as Small C (Basadur 1993, Isaksen 1988)		Application An Application component (Amabile 1988)
	Intrinsic and developmental Big and Small C can be developed to varying degrees and is agreed to involve short and long temr investments in time, commitments and resources (Amabile 1988). Small C is an essential, intrinsic or natural inclination among people, encouraged by meaningful and whole work and life experiences (Isaken 1988)		Purposeful Intention of benefit or value, for example commercialisation of creative ideas (West and Farr 1999)
	Holistic and complex Is holistic, multi-facated and complex (Feldman 1999). It is also contextual based it is influenced by situational factors such as domain and environment (Csikszentmihahyi 1999). Holistic explanations about creativity highlight the inter-relatedness of the person, process , product and process (Amabile 1999) It is domain-specific (Amabile 1999, 1988, 1983)		Managed or strategic A managed process (Gaynor 2002) Small or large Scale Can be valued on a large or small scale routine (incremental) or radical (radical) (Gayor 2002)

Source: Adapted from Slavich (2010)

1.5 Creative Industries as Context

We have chosen creative industries as the empirical settings for our research. These sectors are becoming increasingly important components of moderm post-industrial knowledge-based economies (Van der Pol 2010). Not only are they thought to account for higher than average growth and job creation, they are also vehicles of cultural identity that play an important role in fostering cultural diversity (Van der Pol 2010). Several creative industries also known as cultural industries have been defined as activities which have their origin in individual creativity, skill and talent

and which have potential for wealth and job creation through generation and exploitation of intellectual property (DCMS 2001). According to Thomson (2002), cultural and creative industries consist of those organizations that 'design, produce, and distribute products that appeal to aesthetic and expressive taste more than to the utilitarian aspect of customer needs, such as films, books, building design, fashion and music'. According to Thomson (2002), the main activities of these industries are the 'production or products that serve important symbolic functions such as capturing, refracting and legitimizing societal knowledge and values.'

In other words, creative (cultural) industries are understood to involve mainly industries that commercialize literature, music, film, and visual and performing arts (Throsby 2001). All these industries face, on an ongoing basis, tensions between artistic and commercial values. Indeed, the debate on industries that commercialize cultural products is rooted in a sociological debate emanating from the Frankfurt School. Horkheimer and Adorno in 1944, with a rather negative view of the industry, argued that art and culture were being transformed into an industrial mass product (Horkheimer and Adorno 2002). Moreover, cultural industries operate in a project-based context (DeFillippi and Arthur 1998). Technology has been an important dimension in cultural and creative industries. The creative economy straddles economic, political, social, cultural and technological issues and it is at the crossroads of the arts, business and technology (Van der Pol 2010). Therefore, understanding the role of technology and in particular the IS in creative industries and its use has been given an important role, especially with the role of digital distribution of design, and music which has developed global markets and new industries (PWC 2007).

1.6 Summary

In this chapter, we have discussed various definitions and trends attached to creativity and technology. The topics presented in this chapter are used as contextualisation of the literature reviews for the articles I and II and III which will be presented later.

The goal of this research is to examine the place of creativity in information technology (IT) research. We examined research on creativity in the information systems (IS) discipline and discussed the relationship between creativity and technology. The thesis contains three articles, the summary of which is as follows: In the first article, we conducted a literature review and examined the place of creativity in IT research, positioning this research on the basis of Orlikowski and Scott's (2008) classification of variance, process, and relationality. We positioned the creativity literature in IT research under variance logic and we proposed avenues of research to study this relationship by adopting social process logic. In the second article, we focused on the impact of technology on creativity and conducted an ethnographic study on a festival in Quebec City (*Carnaval du Québec)*, discussing this relation under transmissive, interactive, and imaginative categories. In the third article, we focused on the impact of creativity on the use of technology and conducted a qualitative research study on the radio industry in Montreal; we discussed creativity under two themes that play important roles in the use of technology and showed the importance of creativity in this context. The general goal of this thesis is to extend research on the relationship between creativity and technology from the point of view of social process logic in the IS discipline.

Key words: Technology, creativity, social process, actors, creative industries, technology-in-use.

CHAPTER II

METHODOLOGY AND DESCRIPTION OF CASE STUDIES

2.1 Qualitative Research in Information Systems

In this dissertation, we have chosen to conduct qualitative research rather than quantitative. Qualitative research suits in-depth investigation of research phenomena that are social and contextual (Patton 2002). On the other hand, quantitative approaches are generally used as means of understanding objective phenomena (this could include variable, factors, and hypothesis) (Crotty 1998). Part of our research is to understand creativity, and creativity is a complex phenomenon requiring rich description and multiple perspectives. Qualitative research thus presents advantages in human science research. One of the main aspects of qualitative researches which have been articulated by many authors is its contextual nature. High ranking scholars such as (Denzin 1974, Patton 2002, Yin 2009) have emphasized the importance of context in these types of research. Furthermore, qualitative research was appropriate for our research as there was a need for a holistic understanding of participants' experiences in complex matters of creativity. Qualitative research does however have some weaknesses, one of which is the subjectivity of the researcher (Guba and Lincoln 1994, Patton 2002). This weakness can be minimized by systematic and creative data collection and interpretation of data (Patton 2002).

In the IS discipline, like any other discipline of human sciences, qualitative methods are widely used. One of the motivations for doing qualitative methods, as opposed to

quantitative methods, is the ability to observe and converse freely. The important part of qualitative methods is the fact that it enables the researcher to understand people and the social context in which the study happens.

In this chapter, in addition to what will be explained further in articles I and III, we describe the context in which we have conducted our study. We also describe the methodologies which have been used to conduct the studies. For the 1st case study, we used the setting of cultural industries, known also as creative industries and conducted an ethnography study. The study was done in the Carnival of Quebec, in Quebec City, a city in the Northern part of the province of Quebec, Canada. For the second case study, we conducted a single in-depth case study, based on qualitative semi-structured interviews in a Radio organization based in Montreal, Canada.

2.2 Ethnographic Approach (Article II)

As previously mentioned, we have decided to use ethnography study as our research method, which refers to both the research method and the written account of describing the case and getting more insights into the work place (Morse and Field 1996). Since our aim was to study the impact of information technology on creativity, we have chosen this qualitative research method as we foresee the social world as a process and not as static event. Therefore, ethnography, as the means of studying the social process, while observing the study and getting insights into human phenomena and interactions with the environment (technology) was a suitable approach to achieve the aim of our study. One of the well-known definitions of ethnography given by Hammersley and Atkinson (2007) is:

> *'... Ethnography is a particular method or set of methods. In its most characteristic form it involved the ethnographer participating, overtly or covertly, in people's daily lives for an extended period of time, watching what*

happens, listening to what is said, asking questions – in fact, collecting whatever data are available to throw light on the issues that are the focus of research. '

The ethnographical approach used for this study was based on an in-depth involvement of the researcher in the field. We have gathered and developed ethnographical notes to understand the impact of information system on creativity with an active participation of the researcher in every activity within the context of the research.

2.2.1 Description of the Case of 'Carnival of Quebec'

In Canada, the Cultural industries, also known as Creative Industries, play an important role in economic growth. While they have inherently creative characteristics, they have been given important attention by cities like Montreal and Quebec City. According to Statistics Canada, the direct impact of cultural industries to the Canadian economy in 2001 amounted to more than $38 billion dollars, which is close to 4% of the Canadian economy. It is important to mention that the growth is ongoing. Based on statistics, we see an important economic impact of cultural industries in the Canadian economy. As an example of the GDP contribution of Festivals or Carnival in Canada, Statistics Canada report shows the proportional growth of Festivals in Canadian economy over a 4 year period. Table 4 below illustrates this growth by the industry. Given the importance of creative industries and the lack of empirical research in these industries, we have decided to conduct our case study in festivals.

Process of choosing the Carnival of Quebec: At first, my supervisors and I gathered the names and data on a few festivals in the province of Quebec. Among all of them, we short-listed 17 festivals in the province; notably: *Festival des guitares du monde*,

H2O festival Coop IGA Amos, *Le tour de l'Abitibi – Coupe des nations*, Truck Rodeo, emerging Music festival, *Concert aux iles du Bic*, *Fete du Chocolat de Bromont* and Carnival of Quebec. Given the importance of Carnival of Quebec and its international and local reputation, we have decided to go along with the Carnival and we made initial contact. The main entrepreneur of the Carnival was very kind and helpful and open and he came to our University office, during his visit to Montreal, where we met and agreed to conduct our study on the Carnival of Quebec.

Table 4: Place of Festivals in the Canadian GDP, Statistics Canada Report 2002

GDP growth rates in culture sub-sectors

	Percentage change						Average annual percentage growth rate
Culture sub-sectors	1996 to 1997	1997 to 1998	1998 to 1999	1999 to 2000	2000 to 2001	1996 to 2001	(1996 to 2001)
Festivals	-1.2	33.7	11.3	13.7	13.7	90.0	14.2
Film industry	0.5	20.7	12.1	6.7	4.6	52.0	9.0
Architecture	-11.7	34.1	2.9	34.0	-10.5	46.2	9.8
Advertising	6.3	0.6	20.7	13.3	-1.6	44.0	7.9
Written media	7.1	5.6	3.9	12.5	7.5	42.1	7.3
Broadcasting	13.0	0.02	2.0	9.8	5.5	33.5	6.1
Heritage	2.1	5.9	5.0	5.3	4.2	24.4	4.5
Design	6.5	1.9	3.2	7.8	1.9	23.2	4.3
Photography	-27.9	0.9	53.2	4.5	-8.6	6.4	4.4
Libraries	-0.8	-0.8	-0.8	-0.7	-0.7	-3.7	-0.8
Performing arts	-6.3	14.2	1.2	-17.6	5.4	-5.9	-0.6
Sound recording and music publishing	12.0	7.8	-31.0	9.9	-5.3	-13.3	-1.3
Visual arts	-10.8	6.2	9.6	-6.02	-15.6	-17.7	-3.3

Source: Statistics Canada.

History and the Importance of Carnival of Quebec: The empirical setting of this case study was Quebec City, a city in the Northern Part of Quebec, where the Carnival, one of the most famous winter carnivals in the world, takes place. The Carnival of Quebec has received important attention from the Federal Government of Canada and provincial Quebec government. In addition, *The Bonhomme,* the mascot of the Carnival of Carnival, is a key figure of not only the Carnival itself, and its creative dimension, but has also been an important political (or marketing) figure accompanying the Premier of Quebec in a few business development trips overseas.

Moreover, the *Bonhomme* of the Carnival symbolically receives the key of Quebec City for the course of Carnival from the Mayor of the Quebec City.

Since the beginning of the French colonisation of Canada, the inhabitants of New France created a rowdy tradition of getting together just before Lent to eat, drink and be merry. The custom of celebrating from the end of January until mid-February has long been popular. The Quebec Carnival in Quebec City, also considered the world's snow capital, started in 1894 (Provencher 2003).The Carnival of Quebec was interrupted by the Two World Wars. The first official edition of the Quebec Winter Carnival took place in 1955. The Carnival snowballed into an undeniable manifestation for the entire Quebec City population, and it also became an important vehicle for tourism and economic activity of the city. This winter festival or carnival plays an important role in the City's GDP growth. In 2011, the 57th edition of the Carnival alone generated more than $31 million incremental GDP for the city and created more than 630 additional direct jobs for the population of Quebec City[1]. The number of visitors to this event was approximated at 750,000 tourists from various locations within and outside Canada. The Carnival is unique because of its location. Its reputation has spread beyond borders due to increasing international recognition. From one winter to the next, the Carnival enriches its activity program. The activities in the carnival are mainly" winter sports, snow sculpture, dogsled races and canoe-kayak races on the St-Laurent river. It is the largest winter carnival in the world and is the third on the list of the top carnivals after the famous Rio and New Orleans carnivals (Provencher 2003, Hulbert 1971). It is important to note that winter in Quebec is not an ordinary winter; the average temperature during the carnival is about -20 degrees Celsius whilst not taking into consideration the wind factor.

[1] Carnival website

Organization of Carnival of Quebec: The organization of this carnival is quite typical in the sense that the number of employees varies depending on the work required. There are approximately 55 permanent employees in the carnival premises throughout the year, and they are considered as full-time employees of the carnival. The second parts of employees are the ones are hired during the pre- and post-carnival periods. The duration of their work is approximately 2-3 months. The third type of employees are mainly volunteers who work free of charge during the carnival and help with the organization of the carnival by giving assistance to tourists and taking care of the premises. It is important to note that the location in which the carnival takes places is very central and meaningful. It is next to The Quebec Parliament and the historic Plains of Abraham (a historic area within the Battlefields Parks in Quebec City) which recalls the English-French traditions of Quebec City and the province of Quebec.

2.2.2 Strategies for Interacting with Empirical Material

2.2.2.1 Preliminary Data Collection (phase one)

After first contact with the carnival authorities, we designed a plan of intervention at the carnival premises to conduct our study. At first stage, as mentioned, the entrepreneur general of the carnival came to our office around April 2009, where we discussed in details our intervention in Quebec City. Our first study was to understand the nature of the carnival; therefore, we requested documentation from him. It is important to note that each year, at the carnival office, they create a press review of all that has been said and discussed in the media over the carnival. We received a copy of this book named : *le 55e Carnival a entrainé tout le monde dans la mascarade ! 30 janvier au 15 février 2009*. After careful review of this document as well as the official website of carnival, we were invited to the *Défilé du Canaval* , a rally of the Carnival in Montreal, when each year, the carnival of Quebec comes to Montreal to show some of their creative works to Montrealers and attract them to the

following year's event. This rally took place in September 2009, where we were personally present in order to understand what the Carnival means in real terms.

Our second intervention took place on a trip with my supervisor to Quebec City on September 11th 2009, where we went to the HQ of the Carnival located in a suburb of Quebec City, where the production of creative goods and rally machines are physically present. We had a meeting with the main entrepreneur, the director general, and we were introduced to various employees in the carnival office and we have been welcomed by all members of Carnival operational and technical teams. During our first intervention, we conducted audio-video interviews of the entrepreneur who gave an overall view of how the carnival works, and what they do in the carnival. This gave us a better understanding of what we have in the carnival and what we can study.

After the day-trip to Quebec City, we prepared a summary of our meeting and (together with my supervisors) concluded how we can intervene and conduct our data collection. The carnival edition of 2010, where we conducted our case study was planned to take place from January 29th 2010 to February 14th 2010. We decided to be present starting from the 1st week of January, until the end of the Carnival and until the dismantling of the carnival was over. This meant that our data collection in observation, ethnography (which will be explained further) took place from the 1st week of January 2010 until the end of February 2010, or approximately two months of data collection. The Carnival lasts for two weeks, however, the preparation and construction took approximately four to five weeks and the dismantling (deconstruction) took another two weeks, thereby giving a total observation period of two months.

We made a second day-trip to the Carnival in Quebec City, on October 16th 2009. During this trip, we now had better understanding of the carnival and we conducted

our interviews based on the interview guide that we have prepared beforehand. The entrepreneur presented the plans that he had for the next year's event, i.e. the 2010 edition of the carnival, and we went through the specific details of what he was doing and how the designs and discussions around the theme of carnival would be organised.

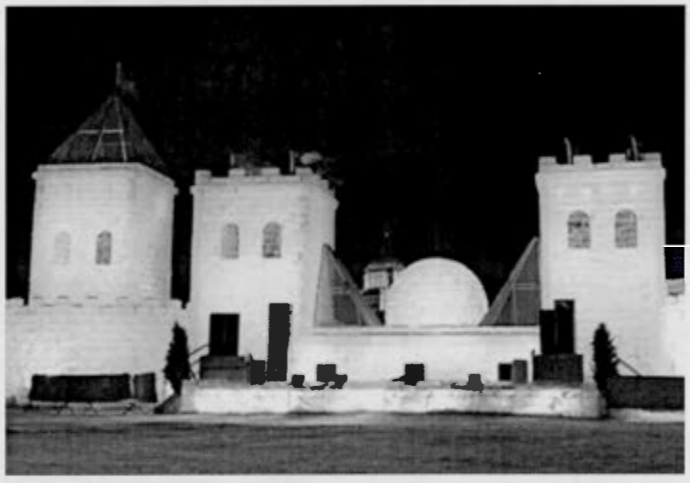
It is important to mention that there is a new theme to the carnival each year. This theme comes as the fruit of discussions and interactions between all three layers of employees who come up with a creative theme for next year's event. While doing so, they get together, ask questions on what has been gone right or wrong during the carnival and they document every aspect of the carnival. The team comes up with a few themes which act as the umbrella for the next year's creative theme. The executive team along with honorary members of the carnival sit together and choose the final theme. We were given access to observe one of these gatherings.

Ice Palace as the Research Case: The carnival, as mentioned, is dispersed in various locations in Quebec City next to the Parliament of Quebec. Traditionally, the Carnival usually has: an Ice Palace, a symbolical construction of an entire palace built in blocks of ice, the Canoe Race, the Snow Sculpture, the Night parade, The Queens and Duchesses, The Effigy and the Carnival *Bonhomme*. Due to the number of different teams and different tasks which happen at the same time in the carnival both at the construction-event-deconstruction, and also at the pre-construction events of the carnival at the carnival premises, we decided to study the Ice Palace within the carnival.

Symbolically, the Ice Palace is built for the *Bonhomme* of the Canival, who is the carnival's guest of honor. It is an impressive construction of an entire palace nearly 50 meters wide, 20 meters deep and 20 meters high with an estimated cost of around $65,000, adding $20,000 for the electric installations (Provencher 2003). The carnival

ice palace is constructed by typical oxygen-free industrial ice blocks and its overall weight reaches almost 9,000 tons of ice and snow. Figure 3 is a picture of the 2010 edition of the carnival's Ice Palace.

Figure 3: Ice Palace – Carnival of Quebec 2010 edition



2.2.2.2 Ethnography Study (phase two)

After the day trips to Quebec City, and gathering necessary documentations for our study, we planned to be present, as mentioned, starting from 1st week of January to end of February 2010. In addition, we were given access to their database, all the documentation that they prepared for the last year's edition and all the press reviews that were published for the 2009 edition of carnival. We decided to conduct an ethnographical study for the purpose of immersing ourselves into the daily life of individuals and have a better understanding of what they do and how they do their work. We prepared our research plan for our intervention in the field. Table 5 below illustrates this plan together with interview guides which have been prepared for our study.

Table 5: Research Plan

Structure	Landmarks
Presentation	The aim of the interview: In the framework of my Ph.D. program at UQAM, I will do a research in your company and I would like to conduct interviews with yourself, your peers and the key actors of your company to understand your creative work, the technologies you use to accomplish your work, both before, during and after the construction of festival. In this respect, I ask yourself about your work, your position, your previous work experience, number of years you have worked in this company Permission: I prepared a consent form taken from TELUQ university, signed by myself, my supervisors. I explained the confidentialities of his/her presence in my research and I requested for the permission to record this audio and or visual interview. I also asked him/her to sign the letter. Once copy was given to the participant and one copy was kept for ethical issues and permission for my thesis. I also mentioned that the access to the interviews is only shared between me and my supervisors.
Work load and the evolution in the company	Each interview began with generation questions relating to the interviewee's roles and responsibilities in the company. It also followed with asking the previous position of the interviewee in the company and evolution of his previous positions until now. I have a few interview guides, because based on my case study, the roles and responsibilities of the people within the case are different and hence slight modifications were required during the interviews. Secondly, since I was doing an ethnographic study, some of my interviews were only composed of the work or the field or the action which I did not understand, or I saw the pertinence and need more clarifications. Therefore, the interview guides were flexible and adjustable in regard to the situation in which I required clarification.
Creativity and technology	The interviews were open-ended questions, and sometimes specific, when required for a specific actions or creativities in the festival. I observed the technologies involved in the creative work and I asked people who are using the technologies while notifying the creative work that they were accomplishing.In terms of open-ended questions, some of them were context oriented, for example, we were not be able to observe or be present in the field for a specific event and we questioned, what happened after I left in that day? Or how did the technology help you to do this specific task? Or how do you describe the impact of technology on this specific creative work? As mentioned, due to nature of an ethnographic study, we had different questions during the events and we cannot plan all of them in advance. Since our aim is to get as much as information

Structure	Landmarks
	we can, in a more detailed manner, we adapted ourselves to the situations and we questioned the employees accordingly. Secondly, we tried to create a friendly atmosphere between the research and the employees and not research employees' relations. We had to imitate the contacts in such a way that we can get the respondent's trust and confidence so that we can get good answers from him/her. Moreover, we also asked to be present in their informal work and gatherings after hours. This created a more relaxing atmosphere and contributed confidence building with the festival employees and reduced the distance with them. After all, we were conducting an ethnographic study and we were immersing in their daily life. It was also necessary to leave the necessary reflection time for the respondent to respond. It was important to be patient and indeed not at all interrupt the interviewee. The interruption may mislead the interviewee and affects the quality of the interview. It is important to also note the elements which the respondent did not develop in the responses and which are important for me. I kept them in mind and noted them, and finally renewed the questions in due time to have clarifications.
Questions	Here, I present the list of questions: 1. Brief description of you, your name and responsibilities in the organization 2. Describe your role and how did you become a member of festival. 3. Are you permanent or temporary employee? 4. How many years are you working with the festival? 5. What are the technologies that you use to accomplish your work? 6. What did you use to do without these technologies before their presence and how do you describe the use of technologies for your work and their impacts? a. Note: This question can be repetitive depending on the number of technologies that the respondent is using for his work. 7. How do you describe the impact of technology on your creative work when the information is available to everyone and it is stored in your data bases? 8. How do you describe the impact of technology in regrouping old ideas into novel ideas, or even exploring for novel ideas? 9. How do you describe the impact of technology in creating contact between you and other member of the organization? How does this affect in your creative work? Can you discuss what you used to do without having this technology? 10. How do you describe the usefulness of technologies in general in your creative work? Can you give examples?

Structure	Landmarks
	11. Do you think that technology can hinder your creativity and if so how? 12. If you have thing else to add, please let me know. Note: The interviews were conducted mainly in French but there have been interviews in English too.
Acknowledgement	The interviews were ended by thanking the participant, assuring the confidentiality of the answers. I also requested that I might need to return and ask for clarifications or conduct a complementary interview.

Before going to the carnival premises, we created a set of dimensions to study the creative work in the case study. Each set of parameters came up as result of the 1st phase of data collection, where we went to the carnival premises and understood the nature of work in the field.

Table 6 illustrates the set of direct observation parameters for our observation in the field.

Table 6: Observation Parameters

Context	Indicators
Before the construction	Visiting the place, visiting the atelier, the work groups, the method of work, the ex-changed discussion between them, frequency of contacts
During the construction	The geography of the place; the group work, the method of organization of work (including use of technology); the ex-changed conversations; the frequency of contacts both while working and also after work and during breaks; preparation for the meetings; decision makings, description of place and weather; identification of creative work and the technologies related to them;
During the festival	The type of ceremonies; discourses and the discussions; the reaction of employees; the reaction of participants; technologies used, how they are used;
After the festival	Type of interactions; discourses and discussions; final steps of ceremonies; the reactions of the employees;
Dimensions	Landmarks
Daily work and routines	Explaining the current events (how do you explain the situation?);receiving the instructions from the head quarter or the main entrepreneur; construction work on the site; receiving materials ; securities on the site
Technology	Types of technologies available ; interactions between humans and

	technologies ;
Creative work	Creative work ; type of creativity ; how did the creativity appear ; discussion and discourses around creativity and creative work

Source: Adapted from Rouleau (1995)

Each day, after the interviews, observations, taking videos and photos, a daily diary of events was written and completed. Overall, we gathered an important amount of data from the case of the carnival, which are not on used for Article II, but we plan to use them for other articles in the pipeline. We gathered 21 days of ethnography study. Everything was recorded, everything was noted. After the carnival was over, we gathered all the information and created an inventory of the collected data. Overall, we collected 1781 pages of documents, wrote 116 pages of field notes, and gathered 25 hours of audio-video and 511 photos from the carnival. A detailed understanding of the inventory of our case is attached to thesis. (Appendix 1)

2.3 In-depth Case Study (Article III)

In the second empirical research of this dissertation, we conducted a study on the radio industry. Since I have engineering background, digital broadcasting and digital world have been always a great personal interest to me. Moreover, I have been working in Radio stations both in France at Radio France International and in Canada at Radio Canada International. Therefore, studying the radio was not only a means of case study, but was also a personal passion towards the industry, and also I wanted to have more knowledge about recent evolutions. Our aim of research for this empirical case study was to understand the impact of creativity on the use of technologies in the radio stations. However, before presenting the case and the details of the qualitative research, it is important to contextualize and present an outline of the change in radio industries which have been partially a motivation for this research on the digital world.

Radio Industry: Towards Digitalization: Existing analogue radio services (such as AM and FM) have for a long time provided good quality sound and favorable reception conditions. Unfortunately, when conditions are less favorable, AM and FM broadcasters suffer a loss of sound quality. Obvious examples of this include:

- Night-time fading experienced on AM radio;
- Signals reflected from building or hills (multi-path propagation) causing distortion of FM radio;
- Electrical interference, from domestic equipment or motor vehicles, causing unwanted bursts on noise at the receiver side.

Digital broadcasting offers the opportunity to deliver a signal from broadcaster to receiver without any such loss of quality. In addition, nowadays, we have tremendous changes in radio programming on the Internet. With internet radio, all these problems are resolved, and radio-on-demand has been widely used by the end-users on the internet. By introducing Digital Radio and radio-on-demand, both end-users and digital broadcasting centers undergo a tremendous change, both externally and internally. Radio stations can now have access to bigger populations internationally and provide different services to them. These services are more than listening to simple radio stations. For example, with targeted advertising, radio stations can find out the location of the listeners and feed them with local ads; they can feed them with what is going on around the listeners (e.g. news, local events etc.). While a listener is listening to a musical radio station, the station can offer them to purchase songs or albums related to what they are listening to. Moreover, radio listeners can also choose what to listen to, when to listen to it and how to listen to it (with what device). This radio-on-demand creates more flexibility and aims at a more targeted audience for the radio stations and also for the listeners. From the listener's side, we see that a great number of internet users listen to radios while they are working on other issues on the internet at their work-stations, or on mobile devices. Statistics shows that in emerging

markets, 78% of internet users listen to on-line radios while working on their computers or mobile devices. On the other hand, from the mature markets, 58% of internet users listen to radio station while working on their computers or mobile devices. Table 7 below shows the statistics on the on-going growth of radio-on-demand and internet radio while people are doing other activities on-line.

Table 7: Online statistics on Internet Users in Mature vs Emerging Markets 2009

Online Activities of Internet Users in Mature* vs. Emerging Markets, 2009 (% of respondents)**

	Mature markets	Emerging markets
E-mailing from PC	95%	96%
Searching for/reading news and information on the Internet	93%	95%
Watching TV on TV	84%	90%
Working from home	69%	88%
Managing personal digital photos and videos on the Internet	62%	77%
Listening to music online	58%	78%
Watching/posting videos on the Internet	59%	74%
Playing video games at home (on console or PC)	57%	69%
Watching TV shows/movies on the Internet	52%	75%
Listening to music on an iPod or other portable music player	51%	76%
Connecting with people on social networking sites	50%	81%
Reading blogs or listening to podcasts	47%	73%
E-mailing from a mobile device	45%	49%
Participating in communities of interest on the Internet	29%	65%
Playing video games on the go (on handheld game device or phone)	28%	56%
Writing blogs or contributing to online references such as Wikipedia	27%	51%
Watching videos on a mobile phone or other mobile device	23%	48%
Microblogging	13%	35%

*Note: *France, Germany, Japan, US; **China, India, Malaysia, Singapore*
Source: Accenture, "Mobility Takes Center Stage: The 2010 Accenture Consumer Electronics Products and Services Usage Report," January 5, 2010

110389 www.eMarketer.com

Therefore, we have a greater number of market shares in creating and designing radio-on-demand. One of the motivations to start this research was to understand the development of radio-players which are used in various radio stations, on various means of access to the radio during the design and conception of these players. Hence, we have chosen a leading radio player designer in the world to conduct our study. However, in order to have a better understanding of the radio industry and the field of research, although we have personally worked in the radio stations, we conducted a pilot study. One of the members of the research team participated in an International conference on Radio industry held in Tokyo, Japan in November 2010. There were over 400 participants coming from all five continents. There were various workshops and conference sessions on the digital world and the change that is happening in this industry. I conducted this pilot study over this conference, which enabled us to understand the setting of digital radio, allowed us to redefine the research questions, improve the interview protocol and also provided us with enough information to find the radio station that we have studied in our case study. At the same time, it enabled us to create links in the industry and understand the settings of this digital radio. During this trip to Tokyo, I gathered many documents, and discussion power-points which were presented during the conference. I also interviewed a few participants over coffee, lunch or dinner, which gave an explorative view on digital radio and how the designers of radio live with this change (digitalizing and radio on-demand) of industry. We have transcribed all the interviews and they have enabled us to create our research interview guide and re-structure our questions in order to get as much details as we wanted during the main empirical case study.

After this phase of pilot case study, we were able to reconfirm the choice that we made initially for our empirical case, and we re-contacted the company and asked for interviews and presence in their premises.

2.3.1 Description of the Radio Case based in Montreal

In order to empirically explore the impact of creativity on the use of technology, we have chosen an important key figure company in the radio player designer industry. This radio player company is considered a North American leader in the live radio streaming business. It is 8th amongst the of the top-10 US radio broadcasters. Internationally, in more than 25 countries, they have designed radio players for more than 2,000 stations. In addition to their office in Montreal, they have offices in Geneva, Boston, Los Angeles, New York and Singapore and they provide end-to-end salutation for live media dedicated for the broadcasters. Their work consists of creating live radio players on every device, whether it is mobile phones, PDAs, iPads and also on the internet. They also conduct audience measurement analysis, showing the number of visitors and listeners for each radio channel, and they prepare comparative analyses of the project radio station to others of the same format. One of the key important creative works they do with their technologies is to insert ads, on the streaming radio program depending on the area or the device where the listener is located. These inserted ads are not only from the geographic locations of the listeners, but also from the type of their connections, their age, and their gender. All these additional technologies are available to radio stations in order to monetize the content of the radio stations. As mentioned earlier, for example, if you are a listener of the typical program which broadcasts a song, on the widget or banner side of the player, you will be able to purchase and listen to other songs of the same album or the same singer. At the same time, you will be able, to check the dates of the next concert of the singer in your area and purchase your ticket online. This is not only additional revenue for the radio, but also brings a competitive advantage for the radio station compared to other radio stations which are doing more or less the same type of content programs for the same targeted audiences. These radio players enable the end-user, listener, to use radio-on-demand, meaning that the end-user can easily save the radio program that he is willing to listen later and buffer it for the future. At the

same time, the end-user then can schedule the program that he wants to listen to in advance. All these features are available to the end-user to listen as he wishes to, where he wishes to, and from any device that he wishes to use. The types of players are presented in figure 4.

Figure 4: Type of players designed by Montreal-based Company

The job of the radio designer company is to design such radio players for stations internationally, and the use of technology in creative ways is at the heart of their work. They have various technologies, from across the spectrum and expertise and they create, design, and operationalize the radio players for the end-users.

At first, before going to the company, the project leader was kind enough to give us a 2-hours presentation of his company and what they are doing. This was quite enriching for us to understand the nature of their work and what they do. In addition,

we were allowed access to various documents regarding their projects, i.e. their on-going projects. Second, the team leader took us to an informal lunch with a few other members of his team in the aim of introducing us to the rest of team. Over the lunch, we were able to get acquainted with all of them, tell them what we are looking for, who we are and have little off-the-record discussions in order to create a trust between the team members and us.

In the third step, the team leader took us to meet the team at their offices and we started to discuss about their position, their work and their on-going project. We examined all the manuals, including internal documents related to their on-going work, and finally we were given a presentation of the company.

Interviews: We started the 1st round of interviews with the team leader and his team members who were working on the ESPN project radio player. The first round of interviews was in November to December 2011. We prepared an interview guide beforehand. An example interview guide is in Table 8 together with the parameters that we prepared for our observation-shadowing during our intervention at the radio station.

Table 8: Observation parameters

Context	Indicators
Before the start of project	Visiting the key person of the company, meeting with him to find out what they do exactly and what are the novelties that they bring to the radio industry
During the project	The group work, the method of organization of work (including use of technology); the conversations; the frequency of contacts both while working and also after work and during breaks; preparation for the meetings; decision makings, description; identification of creative work and the technologies related to them; The type of technologies; discourses and the discussions; the reaction of employees; the reaction of end-user digital software; technologies used, how they are used;
After the project	Type of interactions; discourses and discussions; final steps of project; the reactions of the employees; feedbacks from the end-users for the recursive next projects
Dimensions	Landmarks

Daily work and routines	Explaining the projects, from initial steps, to prototypes, to end users interaction, meetings and brainstorming
Technology	Types of technologies available ; interactions between human and technologies ;
Creative work	Creative work ; type of creativity ; how did the creativity raised ; discussion and discourses around creativity and the creative work; how type of creativities changes the use of technology

In general, we gathered more than 12 interviews, including the pilot study. Average duration of interviews was from one hour to one and ½ hour. We initially, interviewed people whom we thought could provide a rich input and insight into the project. Therefore, we started interviewing the project leader. Subsequently, as the project leader, had introduced us to the rest of team, we interviewed them as well. We were also in their premises and participated in their meetings and did our own observations. The Interview guide is presented in Table 9 below.

The second round of our data collection happened nearly 6 months after the first round and we went again to the company premises and conducted the interviews with more or less the same people. We have transcribed all the interviews, which serve as our primary data for our analysis. The analysis and model of analysis are presented in Article III.

Table 9: Interview Guide

	Landmarks
Presentation	The aim of the interview: In the framework of my Ph.D. program at UQAM, I do a research in your company and I would like to conduct interviews with yourself, your peers and the key actors of your company to understand your creative work, the technologies you use to accomplish your work. In this respect, I ask yourself about your work, your position, your previous work experience, number of years you have worked in this company Permission: I prepared a consent form taken from TELUQ university, signed by myself and my supervisors. I explained the confidentiality dimension of the research and I requested for the permission to record this audio or visual interview. I also asked him/her to sign the letter of consent. One copy was given to the participant and one copy was kept for ethical issues and permission for my thesis. I also mentioned that the access to the interviews will

	Landmarks
	be only shared between me and my supervisors.
Work load and the evolution in the company	Each interview began with general questions relating to the interviewees' roles and responsibilities in the company. It also followed by asking the previous position of the interviewee in the company and evolution of his previous positions until now. Section 1) Questions on the participants' professional activity -Can you tell me about your organization? -Can you tell me about your positions and responsibilities in the company? -Can you tell me about your responsibilities in the project
Creativity and technology	The interviews were based on open-ended questions, and sometimes specific, when required for a specific actions or creative activities in the Radio and the position of people in the company. I noted the technologies involved in the creative work and I asked questions of people who are using the technologies while noting the creative work that they are accomplishing or have accomplished. It was also necessary to avoid repeating questions which may weaken the answers in giving them a negative tone. The researcher left the necessary reflection time for the respondent to respond. It is important to be patient and indeed not at all interrupt the interviewee. The interruption may mislead the interviewee and affects the quality of the interview. It is important to also note the elements which the respondent did not develop in the responses and which are important for me. I kept them in mind and noted them, and finally asked the questions in due time to get clarifications. Section 2) The impact of creativity on technology - Do you consider the radio sector is a creative sector and if so why? -How do you define the creativity or creative work? -How do you describe the relationship between technology and creativity in your job? What are the impacts? -How can your creativity impact the choice of technology for the radio player? Where do you see its manifestations? -To what extent do you use the previous players for the new project? And what are the criteria involved? Where can creativity come from and where do you see it? -Over the process of creating new players for the radio, how would you describe the steps in designing the players and to what extent does creativity play a role in each step? a) You have designed a methodology for the project which regroups the steps to take and the specifications; what is the place for creativity in between and does creativity have an impact on technology, choice of technology, appropriation of technology, usage of technology in each step? Can you develop? b) Can you tell me about the right framing of the players? -How do you describe the impact of your creativity and your colleague's creativity on the use of the new technology)

	Landmarks
	Section 3) Is there anything else you want to mention?
Feedback part of project	Due to the nature of radio projects in this company, there were post-mortem meetings and we were also investigating the post-mortem meetings by conducting questions during these meetings. We also requested for examples of post-mortem documents and gathered data which are distributed among the team members. These questions were asked if the respondent is part of post-mortem meetings: Section 4) – if the respondent is member of post-mortem team. - How do you conduct the post-mortem meetings? - Who are the members of post-mortem meetings? - What are the steps of post-mortem meetings? - How frequent will you do the post-mortems? - Do you do post-mortems internally or also with end-users? - Do you have any quality control team? If so how they are involved in the post-mortem meetings? - How these meetings are recorded and distributed in the organization? - What will happen after post-mortem meetings? How do you integrate the feedbacks into the next projects? - What was the technology used for collaboration and distribution of feedbacks? - What do you think are the key obstacles to integrate the knowledge, you gained from last projects, into next projects? What would be the change of use of technologies with respect to previous project? - What do you think of the impact of creative work on the use of technology after post-mortem? How can you describe it? Any examples? Note: The interviews were conducted mainly in English but there have been interviews in French too.
Acknowledgement	The interviews were ended by thanking the participant, assuring the confidentiality of the answers. I also requested that I might need to return and ask for clarifications or conduct a complementary interview.

2.4 Summary

We have conducted two qualitative case studies for this thesis; ethnography and in-depth case study. Although our initial aim was to conduct both studies on the basis of an ethnography approach, it was not feasible for the second case study, due to the fact that during our research the company has been purchased by a bigger US-based company and we could no longer gain extensive access for ethnography. These two

studies have been used for articles II and III. The case studies and their illustrations are also partially introduced in each respective article. Due to the nature of the article-based dissertation, we have given more space in this section and elaborated our intervention in their premises further.

CHAPTER III

ARTICLE I: RESEARCH TRENDS ON CREATIVITY-TECHNOLOGY: CONNECTING TECHNOLOGY TO CREATIVTY AS SOCIAL PROCESS IN INFORMATION SYSTEMS[2]

[2] Single authored: Hamed Motaghi

3.1 Résumé

Le but de cet article est d'examiner la place de la créativité dans la discipline des systèmes d'information. La place de la technologie dans la discipline telle que comprise par Orlikowski et Scott (2008) est structurée selon trois logiques : variance, processus et relationnel. Nous avons effectué une analyse des travaux existants sur la créativité, et les résultats indiquent la prédominance de la logique de la variance, en particulier dans les dernières années. Dans un deuxième temps, nous avons étendu la recherche de la créativité dans la discipline en tenant compte de la logique du processus social. Cela nécessite un ré-examen de la créativité dans la logique du processus social et de la technologie du point du vue de la logique du processus social et de ses combinaisons. Nous présentons cette fusion de la créativité–technologies de l'information sous l'angle du processus social comme une nouvelle perspective de la recherche dans la discipline.

Mots clés : Créativité, technologie, processus social

3.2 Abstract

The goal of this research is to examine the place of creativity in IS research, identify the existing gap and push further the research. The place of IT as understood by Orlikowski and Scott (2008) is structured according to three logics: variance, process and relationality. We have conducted an analysis of existing IT research on creativity, and the results suggest the dominance of variance logic, at least in recent works. As a second step, we will develop a research agenda for extending the study of creativity in IT research by taking into account social process logic. This requires a reconsideration of creativity from the point of view of social process logic, of technology from the point of view of social process logic and their combination also from the point of view of social process logic. We see the fusion of creativity-IT under social process as the future of research in this field.

Key words: Creativity, technology, social process

3.3 Introduction

Creativity is important for long-term survival of organizations (Amabile 1988) as it enables organizations to remain competitive in a rapidly growing and changing environment. Competitive advantage depends upon the firm's utilisation of the existing creativity and its ability to generate new ideas and knowledge more efficiently (Cummings 1965). Creativity has been considered vital to organizational success and performance (Dewett 2003). Due to its indisputable relevance to individuals, organizations and societies, the concept of creativity has been widely used in many social science disciplines. In the early 1990s, Couger et al. (1993) conducted an extensive literature review on this subject and found that the subject of creativity was a neglected area in information systems (IS) research and required further development.

Following this research, Tiwana & Ephraim (2005) continued in the same direction and conducted an investigation on the place of creativity in information technology (IT). According to their study, a review of IT literature from 1981-2003, creativity remains rather under- studied in the IS literature. For them, creativity in this discipline translates into a couple of themes: first, studies focused primarily on creativity as a causal outcome of IS use. Examples include studies of decisions support systems (DSS) and how the use of software tools stimulates individual creativity. Second, the unit of analysis used to examine creativity has been primarily individuals, whereas most information system developments (ISD) in contemporary organizations are carried out by project teams.

Almost 20 years after Couger et al. (1993), Seidel et al. (2010) took the same approach to investigate the role of creativity in IS research. In this literature review, on average, less than 0.5 percent of the articles published in information systems (IS)

top-tier journals focus on creativity-related topics, and some top IS journals have never published an article on this topic.

The literature confirms that there have been some attempts at presenting creativity in the IS discipline (Tiwana and Ephraim 2005, Couger 1990, Seidel, Muller-Wienbergen, and Becker 2010). However, in contrast to other research disciplines, the IS discipline has looked at creativity from a fairly reductionist position, and there is a gap in understanding how creativity is translated in the process and what the relations between creativity and technology are. In addition, given the indisputable role of creativity in contemporary organizations (Florida 2002, Amabile 1997, Amabile 1988), we argue that although a fairly small number of scholars have studied this topic from an IS perspective, there is a need to look at creativity from this perspective.

The goal of the present research is to push further the research on and academic understanding of creativity studies in the IS discipline and to propose trends of research based on empirical evidence. It is important to highlight that our literature review reveals that there is lack of empirical studies (in particular qualitative studies) on creativity within the IS field. Moreover, not only do we have this lack of empirical evidence, but also the studies in IT-Creativity have given a reductionist view on looking only at the IT from the tool point of view rather than interaction of people with technology in various social contexts (Seidel, Muller-Wienbergen, and Becker 2010).

In this vein, we provide two distinct contributions: first, by adopting the classification of Orlikowski and Scott (2008), we situate the current studies of the relationship between creativity and technology, hereafter also referred to as information technology (IT), and information systems (IS) under variance logic (technical determinism approach). Secondly, we adopt another research trend to investigate the

relationship between creativity and technology under social process logic, in which creativity and technology are considered as processes and are socially based. It is important to emphasize that after technical determinism (Ellul 1967, Fasching 1981), process theories are not new in social science studies; their roots go back to the 1980s and 1990s in innovation studies and socio-technical processes in innovation (Callon 1992, Tremblay 2007, Tremblay 1989, Flichy 1995). We argue, however, that the newness of studying the co-existence of creativity and IT and their relationships in the IS discipline from the social process logic perspective enhances the understanding of the nature of creativity and advances academic knowledge in the IS field.

The general progression of this paper is as follows: after this introduction, we discuss the existing literature in IS-Creativity. Second, we situate this article. Third, we present the problems with this literature and discuss the new frame of creativity and IS under process logic.

3.4 Existing Research in IS-Creativity

3.4.1 Theoretical frame-work and process of analysis

In our literature review, we present the key studies which have conducted the creativity in the IS discipline and the relation between creativity and technology. The process includes identification of definitions of creativity, the definition of technology and their epistemological groups.

Since our focus is on the IS discipline, we have adopted a well-known conceptual framework from the IS literature that enabled us to situate the literature according to a particular classification. For this, we have adopted Orkikowski and Scott's (2008) article on the impact of technology in organizations to situate this literature.

Orlikowski and Scott (2008) conducted an extensive literature review of technology journals from 1997 to 2006 and proposed a comprehensive classification.

In their classification, Orlikowski and Scott (2008) classified the literature on technology published between 1997 and 2006 into two main categories: *discrete entities*, and *mutually dependent ensemble*; furthermore, they proposed a new category: *sociomateriality*.

The first category, also known as *technological determinism*, considers technology as hardware. It is distinct from human beings and organizations, but it can have a direct impact on human behaviour and organizational characteristics. From this perspective, technology is considered an exogenous and relatively autonomous force of change in organizations. In addition, it has a significant and predictable impact on organizations and human practices (Brynjolfsson and Hitt 1995). In this category, humans/organizations and technology are assumed to be discrete and independent with inherent characteristics (Orlikowski and Scott 2008). This category, according to Orlikowski and Scott (2008) follows variance logic; and henceforth, we adopt their terminology and call this category *variance logic*.

The second major perspective posits important attention to the human aspect. Using this perspective, which is known as *human agency, emergent process or mutually dependent ensemble*, scholars suggest that humans are relatively free to enact technologies in different ways (Orlikowski 2010, Orlikowski and Scott 2008). In contrast to the contention of technological determinism, humans can use technology minimally or maximally, individually or collaboratively, and improve it in ways that produce new and unexpected consequences (Boudreau and Robey 2005). Therefore, technology is not the determinant of change; rather, it is implicated in organizing through the discretion of human beings (Orlikowski & Barley 2001). In these theories, human action is central, especially those kinds of actions associated with

embedding structures within a technology during its development (socially embedded structures) and the actions associated with appropriating those structures during the use of technology (Orlikowski 2000). In this category, the underlying logical conception is process-based; and henceforth, we shall adopt this terminology and call it *social process logic.*

In order to situate the epistemological grounds of this literature, we have adopted a well-cited study on epistemology in IS by Orlikowski et al. (1991). In this classification, studies are classified into three paradigms, positivist, interpretive and critical studies. In positivist studies the premise is on the existence of a priori fixed relationships within phenomena which are typically investigated with structure instrumentation (Orlikowski and Baroudi 1991). In interpretative studies, the assumption is that people create and associate their own subjective and inter-subjective meanings as they interact with the world around them. In interpretative studies, the researcher attempts to understand the phenomena or problematic of research by accessing the meanings that participants assign to them(Orlikowski and Baroudi 1991). In critical studies the aim is to critique status quo, through the exposure of what are believe to be deep-seated, structural contradictions within social system, and thereby to transform these alienating and restrictive social conditions(Orlikowski and Baroudi 1991).

3.4.2 Methodology

In order to investigate the place of creativity in IS research, we analysed the six plus two top-ranked IS journals proposed by the Association of Information Systems. European Journal of Information Systems (EJIS), the Information System Journal (ISJ), Information Systems Research (JSR), Journal of Information Technology (JIT), Journal of Management Information Systems (JMIS), the Journal of Association of Information Systems (JAIS), the Journal of Strategic Information Systems (JSIS) and

The Management of Information Systems Quarterly (MISQ).The research strategy was a keyword search for creativity in the title, keywords and abstract fields. We collected the data using the electronic library databases such as *Business Source Premier* via *EBSCOhost*, *ABI/INFORM Global* via *ProQuest*, and *Science Direct* via *TELUQ, HEC Montreal* and *UQAM* databases. Given the fact that creativity has been understudied in the IS field (Seidel, Muller-Wienbergen, and Becker 2010, Tiwana and Ephraim 2005), we extended our research to include creativity and more general journals such as Creativity Research Journal, Journal of Management, Creativity Innovation Management, Administrative Science Quarterly, The Academy of Management Journal and the Creativity Research Journal. In order to select the article, apart from the keywords, we have sorted out the article by reading their abstracts. This has enabled us to ensure the relevance (appropriateness of articles) in our research. We have also conducted backward strategy, i.e. finding articles from the references of main article. In total, we have found 45 relevant articles in the research.

3.5 Variance Logic: Dominance of Research in IS-Creativity

We identified the key scholars who have discussed and investigated the place of creativity in the IS discipline and other scholars who have worked on the relation between technology and creativity in other disciplines.

In terms of definitions of creativity, we identified a number of different definitions that have been given for creativity, notably, creation of something novel; novel idea generation at the individual, group and organizational levels; linking people together in order to create novel ideas (electronic brainstorming); creativity as problem solving; creativity as production of something new, creativity as combining known things; and, finally, creativity as exploring or searching for new things. As mentioned

earlier, creativity studies have paid little attention to the IS discipline and, especially, the relationship between creativity and technology. However, taking into account that the idea of creativity is mainly adopted from the field of psychology (Guilford 1950), and creativity has been studied from different approaches, notably creativity as product, creativity as process and everyday creativity, we consider that there is still work to be done to consider creativity in itself from different angles and its impact on technology in the IS discipline.

In terms of definitions of technology, our literature review reveals that the definition of technology in creativity-technology within the IS discipline is a *tool view*. A tool view, according to Orlikowski and Lacono (2001), is that the technology, the engineered artifact, is expected to do what its designer intended it to do. IT as the independent variable is conceptualized as a black-box, while at the centre of interest is the dependent variable, which is affected, altered, or transformed by the tool. This view has two aspects in the literature; either it is meant for enhancing the productivity of individuals', groups', or an entire organization's productivity, or it is a means for humans to process and access information (Seidel, Muller-Wienbergen, and Becker 2010). This vision is very deterministic in relation to technology and considers that technology is the main driver of change. We consider that there is a lack in this literature since the use of technology is taken for granted across organizations. The same type of technology can be deployed in two identical organizations but give entirely different results. A good example of this type of study is the CT scan study by Barley (1986), which illustrates the same technology deployed in identical places resulting in entirely different outputs.

Apart from the studies of Orlikowski (Orlikowski and Barley 2001, Orlikowski and Lacono 2001, Orlikowski and Scott 2008) on technical determinism, many first-rank scholars, notably Ellul (Ellul 1967), have worked on and initiated the theory of technical determinism. In fact, Jacques Ellul can be considered one of the main

founders of technical determinism. According to the *Dictionnaire de l'histoire et philosophie des sciences* (Lecourt and Bourgeois 2006), the word "determinism" was introduced by Claude Bernard in 1865 to mean that scientific principles which follow existing conditions are determined, fixed in advance. Technological determinism scholars consider technology to be the most important influence upon society; that technology is autonomous, like the weather, and that it causes social change.

Technological determinism is most usually referred to in a crude, undifferentiated manner. In the two extremes, there are hard and soft varieties of technological determinism (Smith and Marx 1994). The hard distinction is based on a spectrum of technological determinism with movement along the spectrum involving the degree of urgency, or the power to affect change, attributed to technology. At the hard end, technology has certain intrinsic attributes that allow little scope for human autonomy or choice. At the other end, soft determinism simply emphasizes the large scope for human intervention and choice. Overall, studies of determinism have followed a positivist approach in order to find generalizable rules from statistical analysis and empirical studies (Markus and Robey 1988). Therefore, they have studied the patterns of impact across various technologies and organizations so that they could predict the effects of technology. For example, these studies are interested in seeing how the use of various media such as audio, video, email, etc. can facilitate communication in virtual teams based on different contingencies, such as team size, demographics, or mutual understanding (Katz and Te'eni 2007). However, inconsistency in the findings has resulted in the development of new perspectives. Boudreau and Robey (2005) identified three types of contradictions within studies: studies in which the expected consequences of information technology did not occur; studies in which different organizational consequences resulted from the use of nearly identical technologies in comparable settings; and studies in which contradictory consequences resulted from the use of the same technology in a single organization.

These findings resulted in producing opposing views that consider the power of other agencies above and beyond technology.

In terms of epistemological grounds, this literature reveals the objectivist paradigm that has produced positivist studies. The underlying view of these studies is that they can capture objective reality and translate it into testable hypotheses, usually in the form of statistical or other kinds of numerical analyses. Our literature review posits that scholars of technology-creativity in the IS discipline have followed the positivist approach in order to find generalizable rules (Markus and Robey 1988) concerning the place of creativity in the IS discipline and the relationship that technology and creativity can eventually have.

In terms of positioning our literature based on Orlikowski and Scott's classification, our literature review analysis (see the Table 10 below) reveals that creativity studies within the IS discipline are highly deterministic. Drawing on Orlikowski and Scott's (2008) classification, the impact of IT is considered via the determinism and variance logic, in which technology becomes a facilitator of creativity within groups, teams, organizations and also at the individual level. This logic posits that technology has been uniformly accepted and used in an organization and does not posit any social or human aspect of technology by itself. In addition, the role of context is minimal in these studies.

In terms of impact of technology on creativity, we find that technology is considered as a supporter and facilitator of creativity (Dewett 2003, Dewett and Jones 2001, Tiwana and Ephraim 2005). Technology is used to codify knowledge across an organization and create information and knowledge bases to which all the users in the organization can have access. In addition, browsing to find novel ideas and exposure to new ideas has been increased. Moreover, technology has been used for coordination and cooperation between various parties, which can lead to increased

linking between people and increased knowledge exchange, while increasing boundary spanning. These interactions between individuals create and maintain interdisciplinary contacts between various levels and people in the organization. Similarly, technology has been considered an enabler of creativity at the individual level (Massetti 1998, 1996, Wierenga and Bruggen 1998), at the group level (Weber 1986, Elam and Mead 1987) and in electronic meeting events (Dennis, Daniels Jr, and Nunamaker 1993, Easton et al. 1990).

Table 10: Summary of finding in the Literature

Definition of Creativity	Definition of Technology	Positioning based on Orlikowski categorization	Examples
Creativity is considered the production of novel and useful ideas. Creativity is considered as regrouping novel ideas	-Tool view / Information technology tool The use of technology is uniformly accepted and there is no interpretation involved in the use depending on contextual factors	Variance: Human is not free to choose their technology, human and technology are independent, technology is stable, effects of technology will be inevitable	Dewett (2003) Burkhardt (2010) Kendall (2004) Mills (1994) Dean (2006) Lee (2003) Lilley (1992) Massetti (1996) Shepherd (1995) Wierenga (1998)
Creativity is : - considered by linking with the idea of genius. - the ability to think visually instead of verbally			Aaen (2008) Edwards (2001) Nagasundaram (1994)
Creativity means radical newness. - seen as a product of the thinking which has novelty or value. - is an unconventional thinking, which requires modification or rejection of previously accepted ideas. Creativity as generating new paradigm-breaking ideas transforming products and services			Couger (1990) Giambatista (2010) Dennis (1993) Garfield (2001) Ocker (1995) Tiwana (2005)
Creativity is -ability to present information in a light which has not appeared before, relates the unrelated, problem-solving, creates originalities			Bawden (1986) Easton ((1990) Elam (1990) Lee-Partridge (2000) Ocker (1998)

Definition of Creativity	Definition of Technology	Positioning based on Orlikowski categorization	Examples
			Santanen (2004) Weber (1986)
Creativity is the ability to put together all the information and put it into a form that other people can understand			Styhre (2005) Avital and Te'eni (2009)
Creativity as development of something novel, non-analytical, solutions for re-engineering			Cooper (2000) Hender (2002)

3.5.1 Problems with Existing Logic

The variance perspective towards technology has various problems. This perspective considers technology as the main driver of change in organizations. According to the IS literature, this perspective has several limitations, among them the observation that deterministic studies are unable to explain the role of human agency and social and historical practices in technology relations (DeSanctis and Poole 1994). Another problem comes from the main assumption of this view, which holds that technology is largely exogenous, autonomous, homogeneous, predictable and stable, and that it will operate as intended and designed across time and space. Thus, this perspective disregards the dynamic and situated actions that can change technology. Evidence shows that even when technologies are 'hardwired' into routines such as ERPs, users can still resist technological features (Orlikowski 2000, Boudreau and Robey 2005, Vaast and Walsham 2009, Orlikowski 2010).

A third limitation of this view is that researchers (Markus and Robey 1988) tend to operationalize technology in such a way that it enables comparison and generalization. Therefore, they use abstract conceptualizations of technology so that they can advance general explanations about technology and organizations. What is missing here is attention to the contextual specificity of technologies, as well as the

loss of thick descriptions about the detailed practices between the social environment and technology that shape the organizational outcomes.

A fourth limitation of this view from the creativity side is that these studies have given limited attention to human and social dependence of creativity while using the technology. In addition, creativity is considered as individual, and the social side of it has been neglected.

3.6 Moving Forward: Beyond IS-Creativity Separation and Towards Fusion of Processes

In view of problems with existing literature, we discuss a new vision of creativity and technology and instead of considering them as separate entities which are independent, we take the logic proposed by Orlikowski & Scott (2008) by looking at the fusion of these two concept based on the procedural (*processual*) logic where interaction and outcomes are seen to be mutually dependent, integrative and co-evolving over time. These inter-connections between creativity and technology are understood to be embedded and emergent, and there is no determination. Technology and creativity are understood as the product of human actions and the structural properties. Therefore, there is an inherent inseparability between the technical and the social (Orlikowski and Scott 2008).

On the technology side, Orlikowski & Scott (2008) present few key articles which illustrate the logic of argument and definition behind the technology based on the process logic. In Barley (1988), technology is defined as objects and actions that admit the possibility of ostensive definition(Orlikowski and Scott 2008) and their logic of argument is to consider the technology which has dual nature, as a social and physical object (Barley 1988). In their logic of argument, they consider that technologies are constructed and reconstructed as they are designed, built, sold and used, but also they acknowledge that this process of social construction is limited by

technology's physical properties and by the larger socio-economic context (Barley 1988, Orlikowski and Scott 2008).

Another pertinent example of considering technology based on the process logic is the study of Roberts et al. (1996). In their study, they consider technology as comprising mechanical (i.e. hardware), human (i.e. skills and human agency) and knowledge (i.e. meaning and concepts) systems (Roberts and Grabowski 1996, Orlikowski and Scott 2008). In addition, their logic of argument is to consider the technology as dual nature, as product and a process where the relation between technology and the structure in the organization is understood to be continuous, changing and interactive (Orlikowski and Scott 2008, Roberts and Grabowski 1996).

On the creativity side, in the last two decades scholars have shifted from internal (individual) to external (contextual) creativity. Like the technology studies, we have different perspectives attached to creativity (Glăveanu 2010), *He*, *I* and *We*, also known as *genius stage*, the *creative person stage* and the *social stage*, which translates into the shift from positivist towards social construction perspective. The social and psychology of creativity has been proposed as such by Teresa Amabile since the beginning of 80's (Glăveanu 2010). In social creativity, the creativity is the result of human interaction and collaboration with the context and between humans (Glăveanu 2010, Westwood and Low 2003). In other words, creativity takes place within, is constituted and influenced and has consequences for, a social context(Westwood and Low 2003, Glăveanu 2010). This idea of creativity as social process rejects the positivist approach towards creativity and adopts a more holistic and systemic way of looking at creativity promoting the *We*-paradigm as social nature of creativity(Glăveanu 2010). It is a process that spurs out of transactions between self and others and self and environment(Glăveanu 2010, Purser and Montuori 2000). A prime example of this research considering creativity as a social process is Perry-Smith (Perry-Smith 2006, Perry-Smith and Shalley 2003). In their view, they

recognize the possible influence of social factors which affect the creativity of individuals (Perry-Smith 2006, Perry-Smith and Shalley 2003). Another prime example of creativity as social process is Watson (2007) where he gives mind maps of creative processes with four possibilities of creative persons, individuals, social units such as teams and organizations.

Process logic is nothing new to the social sciences; it has been studied widely, having been introduced in the late 1970s and 1980s (Langley 2009, Langley 2007, 1999, Mohr 1982, Poole 2000, Cohendet, Kern, and Mehmanpazir 1996). Process logic occupies an important place in innovation/creativity studies and technological studies.

Process theories like variance theories, have been widely used in the IS discipline. Some examples of variance research in IS are Aiman-Smith and Green, Blau et al. and Huber (Blau et al. 1976, Huber 1990, Aiman-Smith and Green 2002). The following are two well-known definitions of process. The first is by Nicholas Rescher in his book *Process metaphysics* (Rescher 1996). It focuses on the nature of processes: "A process is a coordinated group of changes in the complexion of reality, an organized family of occurrences that are systematically linked to one another, either causally or functionally" (Rescher 1996).

In this definition, process is considered a dynamic that occurs over time; and reducing that process to a term such as implementation represents "synoptic thinking": a kind of thinking that tends to reduce a complex change process to a single concept (Poole and Van De Ven 2004). While that concept captures something important about the essence of the process, it misses many of other things that go on in the lived experience of the process. Therefore, in looking at these processes as coordinated groups of changes that are systematically linked to one another and extend over time, we are really adopting a very different frame of reference in studying organizations.

The second definition involves what it is to live like a researcher. Monge, Farace et al. (1984), in a very influential psychological study, consider that the researcher perceives the pattern in the process and that pattern is perceived in reference to time: "A pattern that is seen in references to time is called a process" (1984). We present an extension of looking into creativity – IS via logic of process by conducting qualitative researches.

3.7 Conclusion

This study was motivated by the idea that creativity is essential for the continuous breadth of IT in organizations. In addition, our intention was to understand where the discipline situates itself with regard to creativity-IS studies. Although there have been a number of attempts in the past, we still argue that scholars in IS have given fairly reductionist approaches towards creativity-related phenomena. In other word, despite the fact that there have been more studies in IS on the concept of creativity, we argue that we still have a deficiency in the literature. First, our findings suggests that studies of creativity in the field of IS have mainly looked at the creativity and IS from the variance logic, where the two concepts are independent. In addition, their view towards technology is the tool view, which is a deterministic approach. While the IS discipline has produced some remarkable results in the creativity-IS field, we propose that there is room for pushing further the discussion around the concept of creativity by looking at this from the process logic, where the role of IT and creativity are considered as inter-related and co-evolving over the period of time.

The concepts of technology and creativity have been studied separately from the process logics, the works of Amabile, Orlikowski, Barley and many other scholars in this field have studied these concepts. However, the ensemble of these two concepts from the logic of process is missing in the discipline. Therefore, we decided to unfold

IS and creativity and look at their fusion as an ensemble of interaction over the process of time.

For future research, we propose to study the process logic further by looking at impact of creativity on the use of technology and the impact of technology on the creativity by conducting qualitative studies.

CHAPTER IV

ARTICLE II: TECHNOLOGY FOR CREATIVITY: TRANSMISSIVE, INTERACTIVE AND IMAGINATIVE TECHNOLOGICAL IMPACTS ON CREATIVE PROCESS[3]

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4.1 Résumé

Nous en savons beaucoup sur la créativité et la technologie comme des concepts isolés, mais très peu sur leurs interconnexions. Dans cet article, nous analysons comment la technologie influe sur la créativité. Dans une première partie, en se basant sur la littérature,, nous créons deux catégories soit les effets transmissifs et interactifs de la technologie sur la créativité, tels que vus par la recherche actuelle. Nous soutenons que ces types d'impacts sont développés conformément à la logique de la variance (Orlikowski et Scott , 2008) . Ainsi, dans une deuxième partie, nous reprenons ces visions dans une perspective de processus social et proposons un nouveau type d'impact - imaginatif -, tels qu'il ressort de l'étude ethnographique que nous avons menée dans le contexte organisationnel et créatif d'un festival culturel au Québec. La recherche empirique est basée sur l'analyse du discours des entrevues et des documents ainsi que l'observation systématique. Les résultats proposent une meilleure compréhension des impacts transmissifs et interactifs de la technologie sur la créativité, mais aussi font apparaître un nouveau type d'impact fondé sur l'imagination virtuelle. Des orientations pour la recherche future sont formulées et discutées.

Mots clés: Technologie de l'information, créativité, l'industrie créative, festival et les études de processus

4.2 Abstract

We know a lot about creativity and technology as isolated concepts, but very little about their interconnections. In this paper, we analyze how technology impacts on creative activity within organizational settings. In the first part, based on the literature, we identify two categorizations of transmissive and interactive impacts of technology on creativity, as they are supported by existing research. We argue that these types of impacts are produced in accordance to variance logic (Orlikowski and Scott, 2008). Thus, in a second part, we reconsider these impacts from a social process perspective and propose a new type of impact – imaginative –, as it emerges from the ethnographic study we have conducted in the organizational and creative context of a cultural festival in Quebec. The empirical research is based on discourse analysis of interviews and documents as well as systematic observation (field notes and filming). Results propose a better understanding of the transmissive and interactive impacts of technology on creativity, but also generate a new type of impact based on virtual imaging. Orientations for further research are formulated and discussed.

Key words: Technology information, creativity, creative industries, cultural festival, process studies

4.3 Introduction

Creativity is an energizing factor in the everyday life of organizations, as it drives motivation for inventing, patenting and innovating in terms of new products and services. The use of Information Technology (IT) can be both the support for and the result of creativity. Indeed, we know that technology facilitates creativity, notably for purposes of information sharing, information exchange, ease of cooperation, ease of communication, and maintaining the historicity of events (Dewett 2003, Dewett and Jones 2001). Our knowledge is still limited for explaining in detail how technology shapes creativity. Moreover, existing research is often theoretical, rather empirical and sometimes limited to a one-dimensional view (the variance logic of knowledge production, as formulated by Orlikowski and Scott, 2008).

In this paper, we seek to make a two-fold contribution. On the one hand, we expand the conceptualization of the impact of technology in creative activity by adopting a theoretical background based on the social process logic. On the other, we analyze the impact of technology on creativity in an empirical context and we highlight new types of impacts. The goal is to explore and understand the impact of technology on creativity and what could be prospective contributions while we look at technology and creativity from the same epistemological ground.

From our literature review in the Information System (IS) discipline, it is clear that technology and creativity have been studied separately from various epistemological grounds, but based on our literature review; we argue that their relationship has been studied only with a positivist epistemology. Therefore to extend the literature, we will consider technology and creativity as based on social process logic.
In the following sections, we will discuss a conceptual mind map on the impact of technology on creativity. We will then present our conceptual framework in the

context of an organization. Lastly, we will apply our framework to a case study in the creative industries.

This article has three distinct parts. First, we classify the existing literature on the impact of technology on creativity as concerns transmissive and interactive aspects. By transmissive, we mean transmission of information in an organization and by interactive, we mean the communication between the actors of the organization. Second, we extend the literature and consider the effect of technology on creativity as a form of social process. Third, we extend our study to a case from the creative industries to discover the effect of the process of technology on creativity and to propose an extension of the transmissive-interactive classification. Our findings confirm the transmissive and interactive from the variance logic but also lead us to propose a new vision of the technological process in relation to creativity based on imaginative technologies.

4.4 Transmissive and Interactive Impacts of Technology: The Variance Logic

In order to examine the impact of technology on creativity, we have conducted extensive research (databases and books: Google Scholar, Google Books, JSTOR, EBSCO, Science Direct) using many terms interchangeably, such as creativity, creating, creative, information systems, information technology and technology. We have identified the key scholars who have discussed and investigated the place of creativity in the IS discipline. It appears that less than 45 papers have been published in IS related journal which discuss creativity in IS discipline. In order to have a deeper underestanding of their definition of creativity, and epistemological ground, we have classified them in Table 11 .

Table 11: Summary of findings in the literature

Definition of creativity	Definitions of technology	Epistemological groups	Positioning based on Orlikowski categorization
Production of novel useful ideas -regrouping novel ideas -Radical newness Putting together from diverse resources Problem solving Reframing and re-engineering Solution findings	Tool view, IT artifact	Positivist	Variance, determinist approach

Further, we have deepened our analysis of the classification of the impact of technology on creativity and we have found nine types of impacts of technology on creativity under two larger categories. As presented in Table 12, we have organized them according to the two axial c ategories proposed by Dewett (2003): Interactive impact refers to the way technology enables interactions between individuals in the organizations.

Transmissive categories suggest a general nature of technology as a facilitator of creativity by transmitting information across the organization, preserving the history of events, enabling access to information, enabling combining data and other types of information and exploring new things. Interactive categories, on the contrary, stimulate creativity by helping people (e.g. groups, departments) contact others, exchange information and coordinate activities.

Table 12: Transmissive and Interactive Impact of Technology on Creativity

Impact	Technology	Creativity
TRANSMISSIVE IMPACT		
Codifying	Assists (a) the storage and retrieval of critical documents and large amounts of data more quickly and inexpensively (Huber, 1990; Dewett, 2003) and (b) the codification of information for capturing and integrating explicit knowledge (Anand, 1998; Dewett, 2003) and increasing organizational memory	Based on access to domain-relevant knowledge and initial knowledge about a specific subject (Huber, 1990, Dewett, 2003)

	(Burkhardt, 2010).	
Accessing	Allows flexible and large access to critical and complex information (Dewett 2003; Mills, 1994; Edmondson, 1998), stimulating a direct involvement of information users (Bawden, 1986)	Based on flexible and large access to information (Mills, 1994), and its effects in terms of increasing (a) autonomy (Burkhardt, 2010), (b) problem solving capacity (Edmondson, 1998), (c) creative thinking process (Couger, 1990) and (d) accurate understanding of information (Mills, 1994)
Combining	Enables the search for new ideas and the comparison of concepts in novel patterns (Boden, 1994, Edwards, 2001).	Facilitated by the search of new ideas (Edwards, 2001).
Exploring	Enables and facilitates search for new ideas and development of previously unknown concepts (Edwards, 2001).	Technology Enables deconstructing ideas to facilitate building new creative ideas and processes based on old patterns (Edwards, 2001)
(Re)tracing	Technology allows creating a traceable history of organization and events into information available to everyone in the organization (Dewett, 2003)	Technology Allows creating an inventory of materials during the creative process (Styhre, 2005)
Sharing	Enables sharing information, which is critical in creativity and intellectual process (Quinn, 1996, Dewett, 2003)	Technology Enables sharing ciritical information and create knowing in the organization (Dewett, 2003)
INTERACTIVE IMPACT		
Contacting	Enables in linking employeers both with and between functions and divisions of organizations, through data bases, repositories, teleconferencing and electronic mail (Dewett, 2001) Allors information acquisition for information seekrs (Dewett, 20014) Enables cooperation and collaboration across levels and divisions in organization (Amabile, 1996)	Technology Allows communication and effectiveness (Dewett, 2001,2003) Based on perspective of information seekers, enables searching for information and absorptive capacity of individuals to get new knowledge from other people and other sources (Tushman, 1997, Dewett, 2003) Stimulates creativity by creating interdisciplinary contacts and will increase peripheral information (Bawden, 1986)
Exchanging	Enables electronic ties which will produce divergent thinking processes (Dewett, 2003) Allows information exchange between people, and between people and machines, enabling deconstructing thought patterns (Proctor, 1991) Enables to answer questions, find solutions and interactive ex-change between users (Detwett, 2003)	Allows information ex-change, identifying mind maps or geographical representation of ideas which allow better conveying of relations and concepts (Edwards, 2001) Enables information precisions, with less expensive communication, easy to access within and between various geographical locations (Detweet, 2003)
Coordinating	Enables horizontal coordination, cross-functional work (Edmondson, 1998, Dewett, 2003) Enables coordination and communication	Facilitates communication and coordination between partieis for problem-solving (Couger, 1990)

	between decentralized decision makers and central planners (Dewett, 2003)	

The overall argument is that the more we have information across the organization, and the better this information, the better our chances of being creative (Dewett, (2003, 2001). In other words, information and communication at the disposal of employees in the organization produce stimuli for creativity.

In this literature, technology is treated mainly as a specific and relatively distinct entity that interacts with various aspects of organization. In this sense, the technology has been considered mainly salient during moments of use. Scholars in this stream of research consider technology as an independent variable. In the same vein, technology can also be treated as an independent variable, viewing it as a moderating variable that influences the organization and work. What is important in this literature is the fact that the assumptions towards technology are fixed entities with varying attributes, and the explanation is based on efficient causality. Moreover, technology is considered fixed, across time and context and the meaning attached to technology is single over time. This literature is based on the various theories or logic of study where such theories are concerned with predicting levels of outcome from levels of contemporaneous predictor variable. At the same time, these studies consider the "cause" as precursor which is posited as a necessary and sufficient condition for the outcome. These theories reside under variance approach or variance logic (Mohr 1982).

Based on our study, we argue that the impacts of technology on creativity have been studied using variance logic (Orlikowski and Scott 2008). In this approach, actual use of technology has been ignored (Orlikowski 2010). Researchers in IS have studied the weakness of variance logic or stream of research and the incomprehensiveness of variance logics to illustrate the real life of technology in the organization (Attewell

and Rule 1984, Huber 1990, Dewett and Jones 2001). In particular, Attewell et al. (1984) consider the need of defining technology within the context and raise critical issues about the social consequeneces of technology. In addition, the recommendations (Attewell and Rule 1984, Huber 1990, Dewett and Jones 2001) posit on studying the technology in a given context and over time (Orlikowski and Scott 2008).

Given the importance of context, time and interactions with technology, researchers in IS have taken a deviated direction from the variance logic where the technology and work in the organization is neither independent nor dependent, but rather the issue is to adopt procedural logic of interactions between people, organization and technology (Orlikowski and Scott 2008). It is these interactions that are impacting the work in the organization over time based on integrative and mutually dependent technologies in the workplace in a co-evolving manner. Therefore, we propose to further our study based on process logic, where the interaction between human, organization and technology are assumed to be interdependent, to examine the technological effects on creativity in terms of transmissive and interactive categories.

4.5 The Creative and Technological Experience of a Cultural Festival in Quebec

In order to explore the impacts technology has on creativity from the social process logic perspective, we have conducted an ethnographic study in a Cultural Festival in Quebec City, Canada. Founded in 1894, the Winter Carnival of Quebec City is a creativity-based organization, producing and commercializing creative products and services. The Carnival snowballed into a significant cultural manifestation, a source of financial incomes, and an important vehicle for tourism for the city. In Quebec City, the Winter Carnival plays an important role in the city's GDP growth. In 2011 alone, it generated $31 million incremental GDP for the city and created more than 630 additional direct jobs.

The number of visitors to this event was approximated at 750k tourists, coming from various locations within and outside Canada. From one winter to the next, the Carnival enriches its activity programs (e.g. winter sports, snow sculptures, canoe and dogsled races) in order to attract more tourists. In our research, we have focused on the Ice Palace, an ephemeral and symbolic construction, because many technological devices are mobilized during the process of creating the carnival artefacts. A magical ice palace is built each year for *Le Bonhomme*, the iconic mascot of the carnival, who is elected as the event's representative and the Carnival's guest of honour.

4.5.1 Ethnographic Study

Since our aim was to understand the impact of technology on creativity from the social process logic perspective, we have chosen a qualitative method of research, as Blaskie (1993) contends that qualitative research views the social world as an evolving process, not a static event. The ethnographic study of technological and creative processes in the festival is intended to challenge theoretical statements on existing categories of technological impacts on creativity (transmissive and interactive) as well as generating new categories. Ethnographic research seeks to understand how people make sense of the world in naturally occurring settings (Hammersley and Atkinson 2007) and understanding events and actions in their natural setting is a core priority in this article. As our focus is the social process logic, the ethnographic approach allowed us to interact with rich and profound analyses for grasping conceptual ideas (Atkinson 1992, Brewer 2000) and meanings people convey (Jones, Moore, and Snyder 1988) to technological and creative practices.

The ethnographic work was structured in three phases:

- Phase I - during the construction of the festival (2 weeks) – interaction between employees and technologies in creating the festival
- Phase II - during the festival (10 days) – interaction between employees, technologies and visitors in creating the festival.
- Phase III – during the the festival (4 days) – interaction between employees and technologies in order to develop ideas to create the next festival.

The research information includes more than 1780 pages of documents, 116 pages of field notes, 511 photos and more than 25 hours of video interviews and observations. The participant observation was conducted over 21 days, where we interviewed workers, did observations, took videos and photographs.

The festival has three phases: planning, construction, and re-construction for the next year. In the first two phases, we were physically present on the site. We took photographs of the events and requested permission for filming. All activities were done so as to gain in-depth information about the different aspects of each phase. Because of the importance of the situation, the camera was placed at pertinent angles. In some cases, the camera was zoomed-in to the event that was taking place. More than one angle was used to get various aspects of the work on site both for the construction and the deconstruction of the festival. During the re-construction, we conducted interviews to complement our data collection.

Each day, we filmed important events and also conducted interviews; but in order to enrich our observation, every evening and every day during the observation period we wrote field notes (Emerson, Fretz, and Shaw 2011). At all stages, we were on site before the construction of the festival and during and after the event. We took notes about the physical conditions of the place, including the use of technology in the organizers' and employees' creative work and their relations with the technology. We took notes on the types of technologies that are used on the premises. We also took

notes on what were the creative works that were done with technology and what the role of technology was in their work. We paid attention to and took notes on the verbal communication between parties in the organization on the field and how they interacted with each other. We took notes on important events going on before, during, and after the festival. We also took notes on how the organizers and employees interacted with visitors to the festival.

To complete our observations, we also conducted two sets of interviews. The first part was done before the ethnographic study, and the second during the ethnographic study. The ones before the ethnographic study were to get acquainted with the festival and what is done in general at the first stage. We conducted several day trips to Quebec City, where we envisaged going to the premises of the festival and conducting long interviews and discussions with members of the festival committee. The second set of interviews, during the ethnographic study, was to confirm our observations and enrich our understanding of the work, technologies, and creativities that will be involved. We also interviewed the key persons, including the main entrepreneur, his assistants and the various people responsible for the different technologies involved in the festival such as the sound engineering team, lighting systems team and monitoring team.

For each interview, we prepared questions according to the events or the parts for which we would need clarification. There were always questions about chronological events taking place during the festival and the operation of the technologies involved in their creative work. Most importantly, what does the use of technology bring to the creative work? In addition, there are aspects on which we needed clarification; and we interviewed employees, not only those employees immediately involved in the event, but also other employees in order to get a more comprehensive understanding of the event and any missing elements. Our aim was to gather as much information as we could during the ethnographic study.

4.6 Analysis

In order to conduct our analysis, we adapted discourse analysis to our ethnographic study. Eisenhardt (1989) and Eisenhardt and Graebner (2007) elaborated an excellent roadmap for a consistent ethnography. Indeed, by providing so many steps for justification of ethnographic studies, the authors imply that social reality is open for inspection. Thus, as language is the chief modality for observations concerning linguistic behavior and interpretation, an understanding of language was taken into consideration for the analysis (Fairclough 2003, Alvesson and Karreman 2000).

In order to examine our findings, we have called upon the process research presented by Langley (2009). In this vein, the effect ofprocess of technology on creativity has been studied over time. This temporal process, which we studied before the carnival, during the carnival and after the carnival, enabled us to trace back and find the historical issues related to the carnival which is important in the core of our study.

It is important to have gathered the information in routine ways and by creating an agenda of the daily works that occurs in the festival. This enabled us to gather a more in-depth inventory of files, audio/video files, photographs and documents when we begin the process of analysis. Overall, we had to be very organized in naming the files and creating appropriate directories in our computer and always be prudent in keeping backups in case anything happens to the computer.

At first we gathered all the information, collected data in our share drive and we created an inventory in order to have an overall view of what we had. Secondly, we checked all the data; including listening to audio files and watching the video files, in

order to find out the type of technologies and their use in the festival. We also looked at various creative work and the related technologies for each creative work.

We have two types of technologies which are deployed during the festival. We call them *Pervasive technologies* and *Localized technologies*. For pervasive technologies, we named those technologies that are used over the course of carnival, before and also after the carnival. For localized technologies, we designated as technologies which are used for specific creative works within the carnival.

We also considered the carnival as a whole a creative work. While interacting with data (Alvesson and Kärreman 2000), we noticed that the carnival works under themes. Each year, there is a theme for the carnival in general. We named the big theme as the macro creativity of the carnival. This general theme of the carnival finds also different expressions throughout each space and event of the carnival. The carnival consists of a few spaces; each of them running on its own and having its own themes. The process of finding these creative themes, whether macro or micro, is also with interaction and use of technologies. We will illustrate this in the next subsections.

4.6.1 Transmissive and Interactive Technologies for Social Creativity

As previously mentioned, we have two types of technologies which are deployed during the festival. We called them Pervasive technologies and Localized technologies. Table 13 presents the type of technologies, the type of creativity and their classifications. The presence of pervasive technologies and the use of such technologies have been studied over time. It became apparent that employees of the carnival use these technologies to access information, exchange information and communicate with each other. The information dispatch and access does not lead to specific creativity by itself, but without such technologies, keeping track of events

and getting feedback from ordinary people are not feasible. Mentioning that, the entrepreneur and his team emphasized that during the event, they keep track of every event by taking photographs, updating the SharePoint, and letting everyone know what is going on on the site. For each task that was accomplished, instead of deleting the task, the entrepreneur mentioned that he will put it as accomplished, because they will get back to it when the carnival is over.

Table 13: Type of Technologies

	Pervasive Technologies	
	Type of Technology	Support and enable creativity
Transmissive and interactive	iPod	It is used to keep track of the advancement of the site, construction plans
	Social Media	People, who cannot come to festival, can download the software app and visit the carnival virtually. Facebook, twitter pages are also there for on-going activities and getting feedback from people. This information are collected and used for discussions for post-mortem and next year event.
	SharePoint	Every activity of the carnival, including before, during and after construction, planning of construction, planning of atelier are kept on the SharePoint which is accessible to everyone in the carnival. This information is discussed after the carnival is over and the information is useful for gathering the advantages and disadvantages of the previous year enabling more creative work for next year event.
	Localized Technologies	
Imaginative	Software design (Architecture)	Design of the carnival palace is done by the entrepreneur who uses specific software to create it in 3D and modeling it.
	Software and console for lighting	Once the design is fixed, the lighting design will take place to create a programming language which will run 24/7 during the carnival operating 156 LED dispatched on the site. The design is accomplished from software and the program is loaded in a numerical console.
	Musical console	Creation of sound system which is semi-automatic. This creates a music sequence for the entire carnival palace event.
Transmissive and interactive	Walky-talky	Communication is the key issue during every event of the carnival. Walki-talki has been specifically used for real time creation of window which was not planned over the planning.

It has become apparent and was mentioned in many interviews that once the carnival is over, they gather data from SharePoint, Social Media and they start on-going

discussions with employees to find out the advantages and disadvantages of the previous year's event. The information and the event is kept on the SharePoint and everyone has access to it to complete, and add information in regard of each event. This information is then used in the post-event (*post-mortem*) meetings and enables the carnival personnel to reveal the problems of last year and design the carnival for the following year. By design, they mean creation of theme of carnival and the theme of the palace, the design of the palace, the design of lighting system, sound system. So all those require potential historical background of the past events in order not to produce repetitive actions and events in the carnival and be creative to attract more and more clients.

The recursive actions are then recorded on the SharePoint and everyone is given access to that information. Over the process of analysis, we understood that these technologies enable communication within and between groups of carnival personnel.

These recursive actions are recorded by use of information communication technologies, whether pervasive or localized technologies. During the process of creative work, carnival personnel use and re-use the technologies to access information. Each person and each recorded information is used to come up with new ideas for the next event. There is an important contribution given to each individual within this process.

The use of technologies enables the members of the team to know exactly who knows what and who knows whom or what he does. This structure enables more in-depth exchange of information and communication via a social environment. The essence of transmissive and interactive technologies which are used both from localized and pervasive ways enable to unfold those technologies that are used, when they are meant to be used, and no one is forced to use the technologies. People use the technologies and these technologies enable this environment over the course of time in the carnival.

Based on our analysis, the use of these technologies is very contextually dependent and they are used by various levels within the carnival. The interaction with these technologies is via a social process as there is no tool view attached to them. What is important is the actual use of these technologies in the context, which enables transmissive and interactive use over the course of time in the given context.

4.6.2 Imaginative Technologies for Social Creativity

The second aspect of creative work is related to specific creativity, while using a specific technology. For example, the design of the palace is done by the entrepreneur and he uses a specific software for such design. This software not only gives him the feeling of being physically on the site, but also gives him the possibility of creating something which is not physically present.

There are localized technologies which are used for architectural means, lighting systems, musical consoles. These technologies create a sensation of physical presence. The entrepreneur himself has become in-charge of the design of the ice palace. After the carnival is over, and the theme and symbolic identification of the ice palace is known, the entrepreneur will be in-charge of designing it and getting it approved by other peers and the CEO of the carnival. It is through interaction with the software and discussions and collaboration with other members of the team that the design takes place and the entrepreneur comes up with the ice palace construction plan.

While the software enables imagination and feeling of physical presence, the discussion, interaction and collaboration between entrepreneur and employees constitute a situated use of software to use (and incorporate) the theme of the ice

palace and create a new design, a novel design for each year. Figures 5,6,7 and 8 show the sketching and designing part of the palace.

Figure 5: Sketches of the Ice Palace

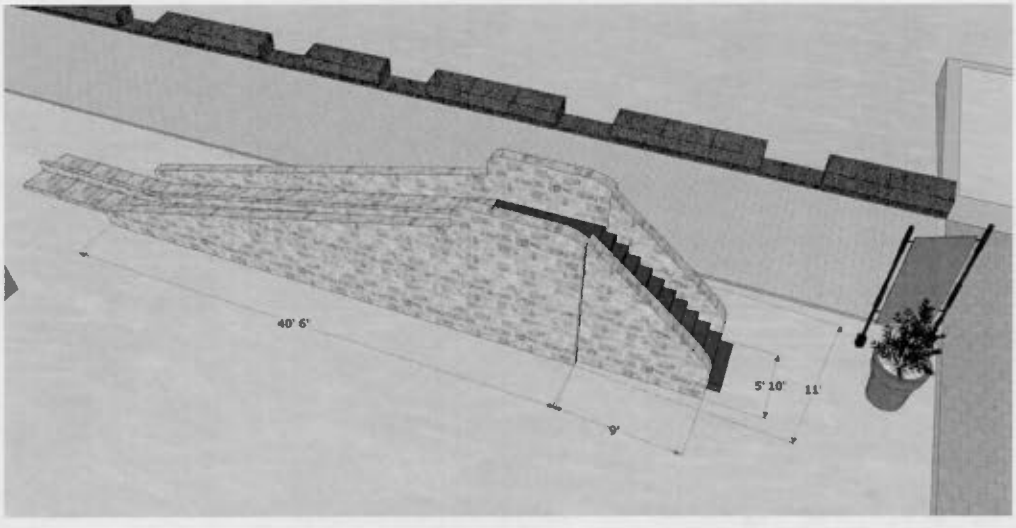


Figure 6: Sketch of the internal part of Palace

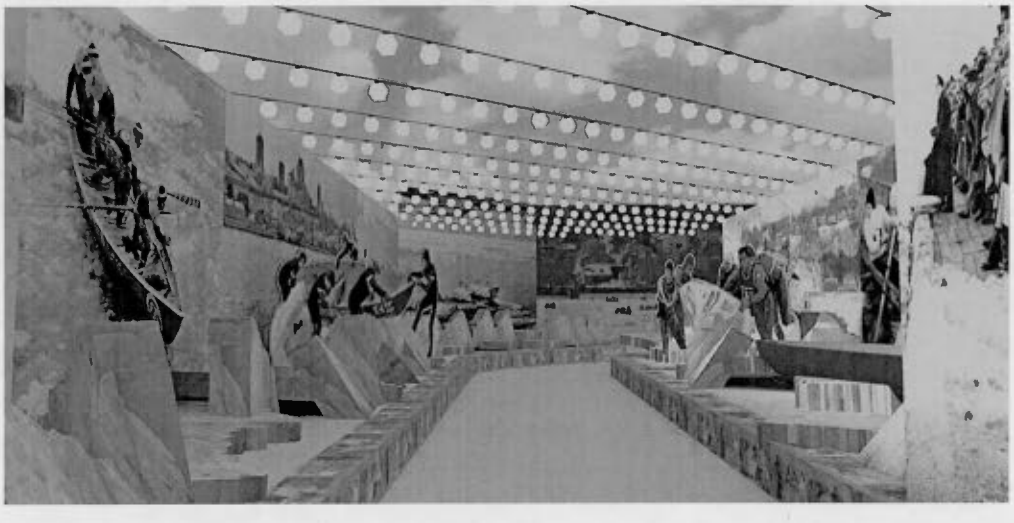


Figure 7: Sketch of the internal part of the palace from above

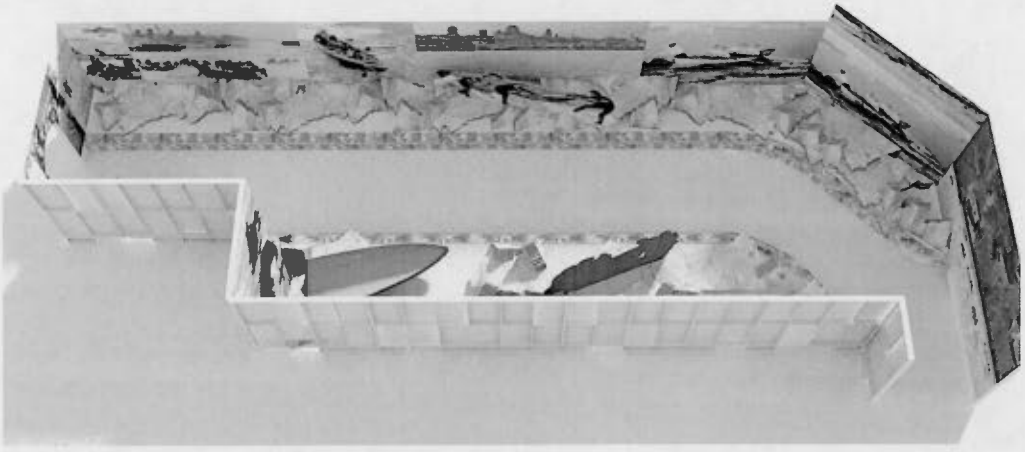
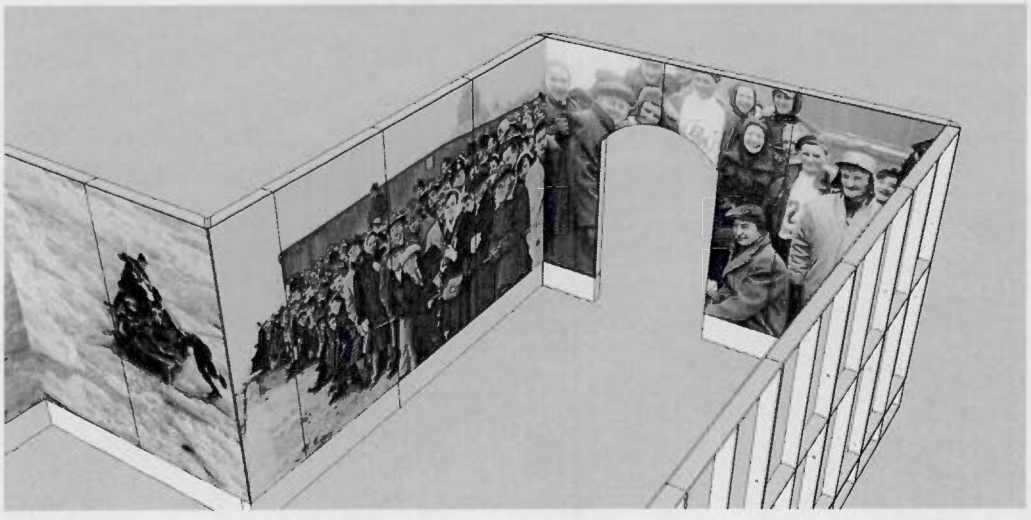


Figure 8: Sketch of internal part of the palace from the side angle



4.7 Discussion

4.7.1 Transmissive and Interactive Technologies Reconsidered

Communication is the key issue for creation during the event. People use communication technologies, whether pervasive or localized in their daily work towards a creative work. The festival in general is a creative work. We noticed that the festival has two big themes. There is one big theme, which we call macro-creativity of the festival and one smaller theme.

The general theme of the festival comes via recurrent discussions that happen between members of festival after each event. Once the event is over, they get together and given advantages and disadvantages of the year, they choose a couple of themes. The short-listed themes (2-3 of them) are then sent to the executive committee, who will choose the final theme among the suggested ones. Every single activity throughout the event is recorded and shared on the SharePoint and kept for festival discussion and use for the following year.

Pervasive technologies enable to keep track of the events, historicity, advantages and disadvantage of the current year. It is considered as a live-calendar of the events in details.
These interactions are enabled and coordinated face-to-face as well as with communication technologies.

The second general theme of the carnival is the event of our study, the Ice Palace. The HQ employees of the festival are in continuous reflection starting from after the destruction of the palace. They regroup the advantages and disadvantages of the previous year. They get ideas from the employees of the festival and gather all data from the media in respect to what was good and what went bad. They come up with

two to three propositions for the theme of the event. Then the CEO gives his opinion on the outcome of the previous year's event and chooses the theme of this specific element.

Communication technologies at the outset are used and deployed in the organization of events in various perspectives, keeping the historicity of the events, and using them during the intense moments of fieldwork. These interactions are aimed towards the creative work of the festival.

The creativity, creation of themes, creation of the construction plan, creation of events and all work in the carnival, which emerges from these communications is not predetermined but it is socially constructed. This social process of interaction between members of the festival event is conducted over time, before, during and after the event. It is important to note that the effect process of technology to creativity is the way people deploy these communications systems in their daily work. They are free to enact the technology as they feel it. Therefore, there is no prescribed use of such technologies for the creative work to accomplish.
In other words, we find interactive and transmissive categories, which lead to information and communication exchange as key issues during this process. But these two are not from variance logic, and the use of technology, interaction between people and historicity of events play important roles in the way this communication and information is constituted over the time. This posits that there are no pre-determined impacts and creativity emerges from the ongoing interactions between people by communication and exchanging information.

4.7.2 Imaginative Technologies through Virtualization

There are technologies which are deployed for the design of events. These technologies are deployed and create virtuality and imagination for the designers. In

such technologies, the user creates a virtual presence before the event has even taken place. The feeling of being physically there while even the festival is not yet constructed is enabled by usage of technology. Walking in the carnival, designing the lighting system over day and night times, all these are enabled with the use of specific technologies.

On the other hand, technology does create a system of virtualization in which the creator can easily navigate with freedom. At the same time, he can play with the objects in this virtual space. The virtual space created by means of technology enables a sensation of physical presence and creating self-avatars. By imaging the physical presence and rotating the objects, the creator is able to create a space which will be eventually realized in the real world.

Therefore, not only does technology enable creativity from information and communication via process logic, it also enables imagining, virtualizing and modeling the reality in virtual space and creation on the cloud to be eventually concretized in the real world.

While creating based on virtual space and 3-D software, the creative person finds unexpected discoveries which were not planned nor seen before. In this way, the creative designer has created a situated-invention in the space that he has created using specific software. The designer brings up the physical objects to the virtual mimic of absolute environment and creates a sort of spatial cognition for himself in a way that he can control the objects, play with them and create a new meaning for them while being all in virtual (Rahimian and Ibrahim 2011).

Computer simulated software enabled by haptic technology facilitates real-time interactivity with virtual objects and makes it possible to model them. At the same time, this Second Life creation enables meta-design and could be eventually

concretized in the real world (Rahimian and Ibrahim 2011, Fischer 2000, Kohler et al. 2011).

Figures 5,6,7 and 8 are selected among the photos we collected and show the design of the palace even before the palace has been constructed. During our observations and interviews, we observed that the designer was able to rotate and prepare day and night time effects of the palace. The same applies for the interior design of the palace. The interior design happens before the construction of palace.

4.8 Conclusion

We have studied the impact of technology versus creativity in the literature. We categorized the literature and classified this impact under interactive and transmissive. However, these two main classifications consider the impacts from the variance logic. Therefore, we have extended our analysis by taking these two classifications and applying them to an ethnographic study and discussing the impact based on process logic.

Our finding posits that in process logic, not only technology has effects on creativity; it also creates an atmosphere of virtualization where the individual is able to interact with the software to create a sense of virtualization and physical presence while designing the palace. Therefore, our contributions is to consider the effect profess of technology on creativity and to propose another classification under virtualization.

CHAPTER V

ARTICLE III: THE IMPACT OF CREATIVITY ON TECHNOLOGY USE: THE CASE OF RADIO[4]

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5.1 Résumé

Nous en savons beaucoup sur la créativité et la technologie comme des concepts distincts. Cependant, notre compréhension de l'impact de la créativité sur l'utilisation de la technologie est très limitée. Il y a eu de nombreuses études dans le domaine SI qui font appel à des notions de technologie en cours d'utilisation et de la technologie en pratique pour comprendre l'utilisation effective de la technologie, mais à notre connaissance, aucune n'a abordé l'impact de la créativité sur l'utilisation de technologie. Dans une première partie, nous présentons la littérature existante sur la technologie en cours d'utilisation (*technology-in-use*) et sur la technologie en pratique (*technology-in-practice*). Deuxièmement, nous présentons l'idée de la créativité comme un processus. Nous soulignons l'importance de la capacité d'absorption dans le processus d'exercice de la créativité et de son impact sur l'utilisation de la technologie. Les résultats sont tirés d'une recherche qualitative basée sur des entretiens et des observations couvrant plus de deux ans dans l'industrie de la radio à Montréal. Les résultats empiriques sont étudiés en utilisant l'analyse du discours fondée sur l'analyse systématique des entrevues, des observations et des documents. Nous avons deux grands ensembles de résultats sur l'utilisation de la technologie: d'une part; l'usage créatif des technologie est en train de redéfinir les flux de communication et d'information; et d'autre part: l'usage créatif des technologie redéfinit le travail, ainsi que les utilisateurs, en fonction de leur créativité sociale et de leur capacité d'absorption, ce qui permet aux utilisateurs d'employer la technologie de manière plus intelligente, en fonction de leur niveau de capacité d'absorption.

Mots clés : Technologie, créativité, technologie d'utilisation, technologie en pratique, logique du processus, capacité d'absorption

5.2 Abstract

We know much about creativity and technology as separate concepts. However, our understanding of the impact of creativity on technology use is very limited. There have been many studies in the IS field that draw upon the notions of technology-in-use and technology-in-practice to understand the actual use of technology, but to our knowledge, none have addressed the impact of creativity on the use of technology. In the first part, we present the existing literature on technology-in-use and technology-in-practice. Secondly, we present the idea of creativity as a process. We highlight the importance of absorptive capacity in the process of creativity exercise and its impact on the use of technology. The results are drawn from a qualitative research based on interviews and observations spanning over two years in the Radio Industry in Montreal. The empirical results are analysed using discourse analysis based on systematic analysis of interviews, observations and documents. We have two main sets of results on the use of technology: first; creative use of technology is redefining the communication and information flows; and second: creative use of technology is restructuring the work, as well as the users, based on their social creativity and absorptive capacity, which enables the users to use the technology in a smarter way, but depending on their level of absorptive capacity.

Key words: Technology, creativity, technology-in-use, technology-in-practice, process logic, absorptive capacity

5.3 Introduction

Over the past three decades, there have been only three studies in the IS discipline that have done a literature review on the place of creativity in the Information System (IS) discipline. The first study was done in the early 1990s by Couger et al. (1993), who conducted an extensive study to understand the place of creativity in this discipline. Couger et al. (1993) divided the studies on creativity into two research streams: the origin-oriented approach and the process-oriented approach. In the origin-oriented approach, creativity arises from the conflicts within an individual. The creative process involves externalizing the internal products of the imagination through the interaction of primitive and more mature types of thinking (Freud 1970, Couger, Higgins, and McIntyre 1993). The process-oriented approach proposes that the individual's creativity is a function of his or her ability to invoke and explore remote associations in selecting a response to a problem (Mednick 1962, Couger, Higgins, and McIntyre 1993). On the basis of this analysis, the authors suggested that creativity is a neglected area in the IS literature.

In a second attempt, Tiwana and Ephraim (2005) addressed the studies on how individual expertise in information systems development (ISD) results in creativity at the team level during the development process. Again, they suggest that there is a need for further research on creativity in the IS discipline, especially in the process of looking at ISD.

In a third and more comprehensive attempt, Seidel et al. (2010) have examined the top journals of the IS discipline and looked into the kind of creativity discussed in these articles. Overall, they conclude that only a small number of scholars have looked into the creativity issue and related issues in the IS discipline, and he posits that less than 0.5 percent of the authors in the top IS journals have attempted to

investigate creativity in this field. However, Seidel et al. (2010) provide no empirical study, and this article is basically a proposal for future studies.
In our paper, we study the impact of creativity on the use of technology in organizations. We conducted a qualitative research based on a case study spanning 2 years in the radio industry in Montreal.

In this research, we open the black box around the Information Technology (IT) artefact and contribute to the understanding of the social aspect of technology and we show how creativity plays an important role in the use of technology.

The literature review reveals that many of the models proposed by IS researchers are typical variance theories embodying an IT artefact (Seidel, Muller-Wienbergen, and Becker 2010). Variance theories usually neglect the socio-technical process involved in the use of technology. IT, rather than being an artefact acting as an independent variable, is fully part of organizational life and it is incorporated in the daily life of organization with all social aspects of the organization. In this way, we argue that creativity plays an important role and has an impact on the use of technology.
We consider that creativity is fundamentally a human process, and people use the technologies differently to accomplish their work in the organization.

From this point of view, we draw upon the two concepts of technology-in-use and technology-in-practice and discuss the main issues related to these concepts. We also discuss the concept of "absorptive capacity" (Cohen and Levinthal 1990, Zahra and George 2002), and we highlight the role of expertise integration while conducting creative work with the use of technology. Our results are twofold: creativity has an important impact on the use of technology as it redefines communication and information flows, and also as it restructures work, while using the technology in a smarter way, depending on the level of absorptive capacity of individuals.

5.4 Theoretical Approach

5.4.1 Technology-in-use

First, we need to understand the existing literature on the notions of technology-in-use and technology-in-practice on the basis of a literature review. Based on our research these two concepts are closely related.

Technology-in-use was introduced widely by the works of Wanda Orlikowski, especially from her article of 1992 (Orlikowski 1992), in which she theorized the duality of technology, inspired by the ideas of Anthony Giddens (Giddens 1987b, Giddens 1979, Giddens 1984) and his Structuration Theory.

By duality of technology, Orlikowski means that technology is a product of human action while it also assumes structural properties. Moreover, by the duality of technology, she considers that technology is physically constructed by actors (who are knowledgeable and reflexive) working in a given social context. It is socially constructed by actors through the different meanings they attach to it and the various features they emphasize and use. She also considers that agency and structure are not independent, and it is the on-going action of human agents in habitually drawing on a technology that objectifies and institutionalizes it.

In that and subsequent studies such as Orlikowski (1995), she proposes that there are two aspects to be analysed in technology: the scope of technology and the role of technology. By scope, she means basically the hardware part of technology, what makes it an object; whereas by the role of technology, she refers to the philosophical opposition of foreseeing technology as a social object, where it is seen as a product of shared interpretation and interventions. In the same vein, she considers that

technology is understood as a social object, which means that it is defined by its context of use.

The prescribed use of technology by the designers of technology is not always followed when the technology is deployed in an organization. Usually, the technology development, and technology usage are accomplished in different organizations; and hence, different perceptions of technology usage are constructed (Orlikowski 1992). In other words, while the technology permits a range of possible uses, it is the technology-in-use that determines its value; and that value is significantly influenced by the set of activities that intervene in the way people interpret and interact with the technology (Orlikowski 1995). At the same time, we can consider that the implementation of configurable technologies is strongly influenced by users' understanding of their own requirements and the properties and functionalities of the technology (Orlikowski and Gash 1994). Thus, the actual use of the technology is also influenced by people's knowledge and experience from previous projects.

Orlikowski (1992) considers that in using technology, users interpret, appropriate and manipulate it in various ways and are influenced by a number of other individual as well as social factors. Moreover, the use pattern changes over time as organizational circumstances change (Orlikowski 1995).

As technology is used within a given context, the users are structuring the technology. The structuring of technologies-in-use refers to the process through which users manipulate their technologies to accomplish work and the way in which such actions draw on and are reproduced in the particular context in which they work (Orlikowski 1995, Barley 1986). The process of structuring technology-in-use, as described by Orlikowski (1995), is an interaction between technology as an artefact

and its actual use, which influences and also constructs and re-constructs the institutional properties of the organization.

After theorizing on the duality of technology (Orlikowski 1992), Orlikowski expands her earlier work and presents a practical lens through which it is possible to examine how people interact with structures of technology use. Users' interactions with technology are thus recursive: in their recurrent practices, users shape the technology structure that in turn shapes their use (Orlikowski 2000). Technology structure is not external or independent of human agency, but exists in the form of a set of rules and behaviours and the ability to deploy the structures (Walsham 2002) that emerge from people's interactions with the technology at hand – technology-in-practice (Orlikowski 2000, Pozzebon 2003).

Orlikowski (2000) considers technology-in-practice to be sets of rules and resources that are constructed and reconstructed in people's on-going and situated engagement with particular technologies. These engagements from her point of view are specific interactional structures that are routinely enacted as the users work with a specific technology, technique, appliance, device or gadget in particular ways in their everyday situated activities. She also believes that users decide to use a technology; and in doing so, they are also choosing how to interact with that technology. Thus, users may deliberately or inadvertently enact different rules and resources from those anticipated by the developers. This phenomenon suggests that technology-in-practice could be different from place to place and from one context to another. According to Barley and Orlikowski (Barley 1988, Orlikowski 2000, Barley 1986), on-going enactment of a technology-in-practice tends to reinforce or re-structure (transformation) the social system. Reinforcement means that the actors enact essentially the same structures with no noticeable changes, whereas transformation means that the actors enact changed structures, with changes ranging from incremental to substantial (Orlikowski 2000).

According to Corradi et al. (2010) viewing the use of technology as a process of enactment enables a deeper understanding of the constitutive role of social practices in the on-going use and change of technologies in the workplace.

In summary, we can conclude that technology-in-practice is inseparable from technology-in-use. It is technology-in-use and the particular ways in which a technology is used that create the practice of a specific technology in a given social context. We can conclude that technology-in-use is phenomenologically embodied in technology-in-practice.

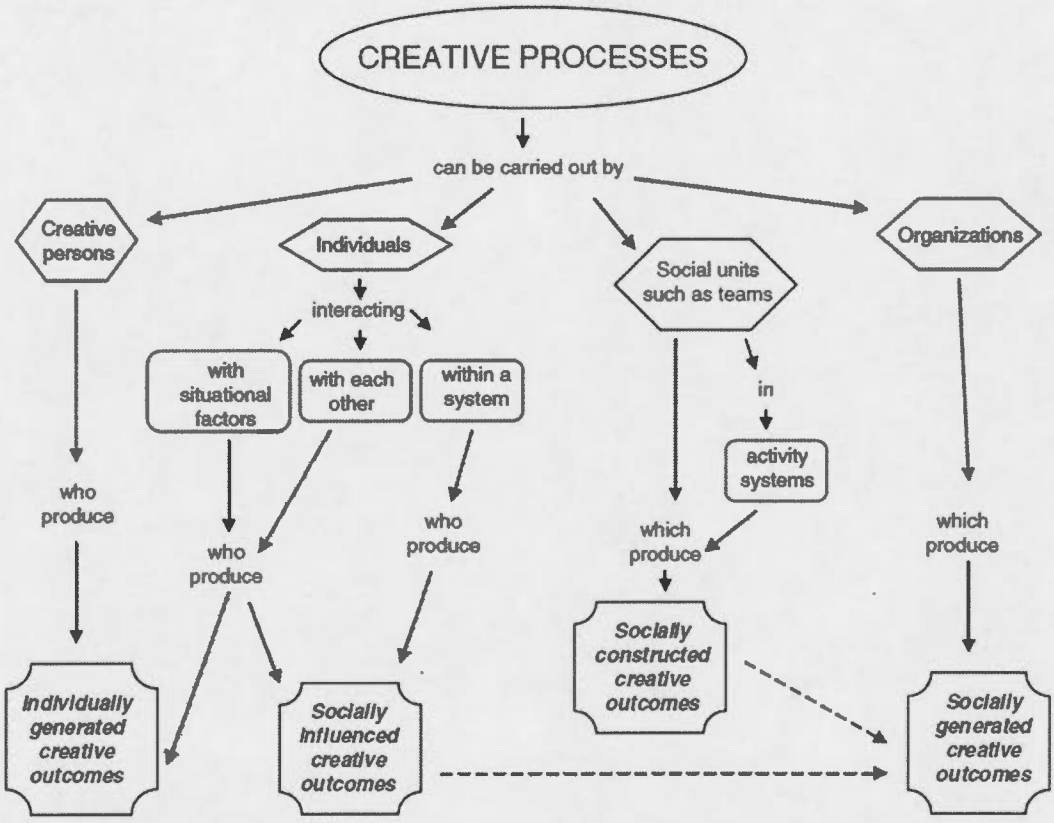
5.4.2 Creativity as a Process

After discussing the notions of technology-in-practice and technology-in-use, we consider that creativity is a process and discuss how the absorptive capacity will influence technology use. For this, we will review what has been said on the kinds of interaction that occur between technology and creativity in a process over time. There is little doubt that creativity is an important value in our contemporary society and, consequently, it became object of study for a variety of disciplines.

It is in the process of transition from an exclusively individualistic psychology of creativity to a more socially oriented one that three concepts emerge: social creativity, group creativity and collaborative creativity. The first reflects a rather theoretical approach (Fischer et al. 2005) referring to the social origins and manifestation of the creative as opposed to a picture of the creative individual working in a social vacuum. The other two notions, group creativity and collaborative creativity, consider more particular instances of at least two individuals working together to generate a creative outcome.

To study creativity as a process, we have adopted the work of Watson (2007) based on the creativity literature in which he gives an extensive framework on social creativity comprising four aspects under four main phases: creative persons; individuals; social units, such as teams; and organizations. Figure 9 below illustrates the creative processes derived from Watson (2007). Creative processes are carried out with creative persons who produce individually generated creative outcomes. In the second phase, individuals interact either with institutional factors, or with each other or with a system to produce socially influenced creative outcomes. In the third phase, the creative process occurs in social units such as teams, with or without activity systems, to create socially constructed creative outcomes. Finally, in organizations, the creative process can be carried out by the organization, which produces socially generated creative outcomes.

Figure 9: Social creativity concept map of Watson (2007)



The outcome is an essential element since it is socially constructed and generated. These social collaborations have been identified in the literature as four patterns of collaboration: distributed collaboration, complementary collaboration, family collaboration and integrative collaboration (Watson 2007). Each of these collaborations has specific meanings. Distributed collaboration is found in long-term partnerships as well as conversations where participants have similar interests and informal and voluntary roles; moreover, the interactions are spontaneous. Complementary collaboration is based on expertise or disciplines which enable cross-fertilization of ideas from different perspectives. People negotiate to accomplish the task and the creators engage in mutual appropriation whereby each person adapts and

integrates others' ideas. Family collaboration is characterized by fluid roles by which one member helps another to move from novice to expert; and, finally, integrative collaboration thrives on shared visions and risk taking over the long term, making transformations to new entities with an emphasis on co-creation. What is important is to understand the negotiations, discussion and shared understanding of the use of technology Watson (2007). There is an on-going interaction between technology and the person which takes place over time to use various technologies and conduct the work. The users have experiences with technologies; they are entitled to use technologies as they want to accomplish their work.

It is important to mention that the "social" is intrinsic to creativity, and the creativity outcome is embedded in the interaction between individuals and technologies, settings and groups.

5.4.3 Absorptive Capacity and Expertise Integration in the Creative Process

Expertise integration has been considered an important issue in Information Systems Development (ISD) (Tiwana and Ephraim 2005, Cooper 2000). Heterogeneity of expertise, the quality of relationships among team members and the ability to interrelate with the expertise of peers in a group play an important role in the creative process (Aaen 2008). In this respect, the absorptive capacity of individuals and team members is an important aspect of the team's creativity (Tiwana and Ephraim 2005). Absorptive capacity has been defined in the literature as a firm's ability to identify, assimilate and exploit outside knowledge (Cohen and Levinthal 1990). Zahra and George (2002) define it as a set of organizational routines and processes by which firms acquire, assimilate, transform and exploit knowledge to produce a dynamic organizational capability. Absorptive capacity has also been defined as the capacity to learn and to solve problems (Tiwana and Ephraim 2005).

A good level of absorptive capacity enables the firm and its members to effectively obtain and use external and internal knowledge (Cohen and Levinthal 1990). This will have an effect on the firm's ability to innovate and adapt to the changing environment and will keep it competitive. At the same time, it will enhance the firm's ability to be proactive and build various competencies of its own as opposed to reacting to the industry's dynamism.

By absorptive capacity, scholars (Cohen and Levinthal 1990, Zahra and George 2002) refer to the notion of an organization's absorptive capacity, which is dependent on the absorptive capacity of its individual members. However, organizational absorptive capacity is not simply the sum of each individual's absorptive capacity. It is not limited just to the acquisition or assimilation of knowledge; it is also related to the organizational ability to exploit the absorbed knowledge (Cohen and Levinthal 1990). In other words, the exploitation of the knowledge in the organization means using the knowledge and allowing it to circulate within the subunits.

While expertise is owned by individuals, and individuals use their absorptive capacity to absorb knowledge from others, it is necessary to understand how the use of technology is affected while individuals integrate specialized, individually held expertise into a collective project (Okhuysen and Eisenhardt 2002, Stein and Vandenbosch 1996). In this vein, team creativity results from finding novel associations and linkages among the diverse ideas, perspectives and domain expertise that individual team members hold (Sutton and Hargadon 1996).

5.5 Methodological Approach: In-depth Case study

Our research is based on a qualitative study spanning two years (2010-2012) at a radio company based in Montreal. Existing analogical radio services (AM and FM)

can provide good quality sound under favourable reception conditions. Unfortunately, when conditions are less favourable, AM and FM broadcasts suffer a loss of sound quality.

Digital broadcasting offers the opportunity to deliver a signal from broadcaster to receiver without any such loss of quality. In addition, the use of a digital system allows broadcasters to offer a completely new range of data services to accompany audio programming. These enable the radio medium to remain attractive to consumers at a time when it is facing increasing competition, most notably from the Internet.

Our case study looks at a North American leader in streaming live radio in downtown Montreal which offers a variety of services to the radio industry, including live streaming of various radio stations and live streaming for the end users. For live radio and on-demand radio, they provide end-to-end solutions such as web-based metrics; insert radio ads on radio streams, depending on the territory on which they broadcast, web media players, mobile players and widgets.

The reality is that end-users are turning more and more to radio-on-demand, where they can choose which radio programmes to listen to, when to listen and from which device. We observe that Internet radio has become very popular. Table 14 below illustrates online activities on the Internet by end users in various countries; this shows that listening to music online has become quite important.

Table 14: Online activities of Internet users in mature vs. emerging markets 2009

Online Activities of Internet Users in Mature* vs. Emerging Markets, 2009 (% of respondents)**

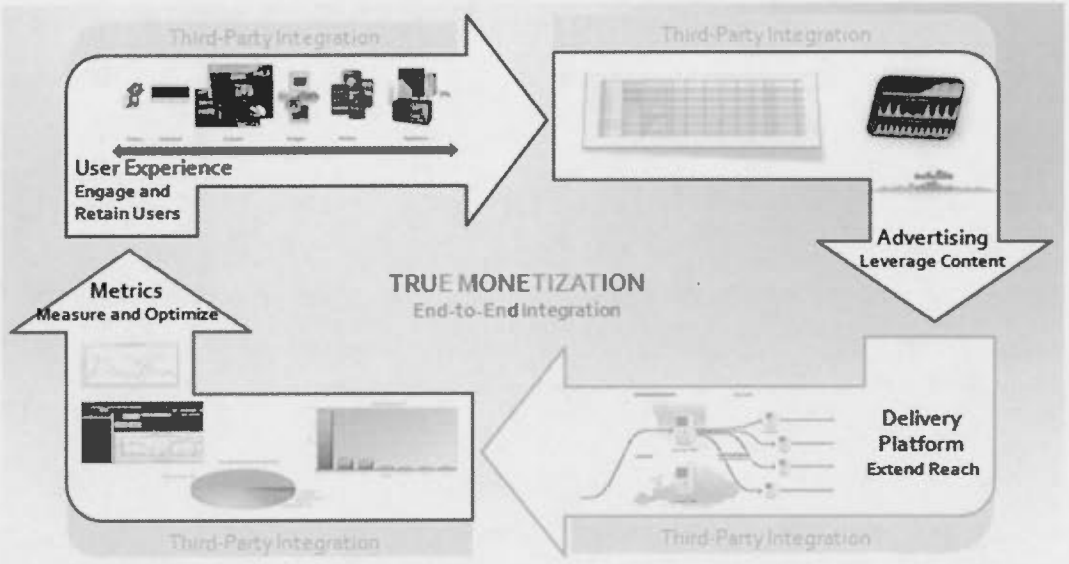
	Mature markets	Emerging markets
E-mailing from PC	95%	96%
Searching for/reading news and information on the Internet	93%	95%
Watching TV on TV	84%	90%
Working from home	69%	88%
Managing personal digital photos and videos on the Internet	62%	77%
Listening to music online	58%	78%
Watching/posting videos on the Internet	59%	74%
Playing video games at home (on console or PC)	57%	69%
Watching TV shows/movies on the Internet	52%	75%
Listening to music on an iPod or other portable music player	51%	76%
Connecting with people on social networking sites	50%	81%
Reading blogs or listening to podcasts	47%	73%
E-mailing from a mobile device	45%	49%
Participating in communities of interest on the Internet	29%	65%
Playing video games on the go (on handheld game device or phone)	28%	56%
Writing blogs or contributing to online references such as Wikipedia	27%	51%
Watching videos on a mobile phone or other mobile device	23%	48%
Microblogging	13%	35%

*Note: *France, Germany, Japan, US; **China, India, Malaysia, Singapore*
Source: Accenture, "Mobility Takes Center Stage: The 2010 Accenture Consumer Electronics Products and Services Usage Report," January 5, 2010

110389 www.eMarketer.com

We study this radio company which does an end-to-end user interface for radio companies around the globe. Their idea is basically a monetization of users for the radio company. Their philosophy is that they will capture every aspect of users who listen to a specific radio station in a specific location, and they will inject the appropriate advertisements for them. The end-to-end monetization process of the radio station is illustrated in the figure 10 below.

Figure 10: End-to-end monetization process for the radio on-demand industry



5.5.1 Interaction with Empirical Data

We have formulated our research question as follows: employees within a creative sector such as radio use various technologies to accomplish their work in a recursive manner and create something novel over the process of their work; they create solutions for the end-to-end user of monetization of the product. We therefore hypothesize that they use their creativity to tweak the technologies (software). The creative process is accomplished in various steps and in each step they use technologies. These technologies are used for codifying information, sharing information, creating historical tracing of projects and communication. Our main question is thus to understand the role of creativity in the use of technologies over the of work process. The absorptive capacities of individuals are also integrated in our question as we seek to understand how users integrate their knowledge coming from the organization and also their own previous knowledge to use the software within the scope of project. In this vein, we have created an interview guide which led us to

look into the use of technology from the technology-in-use and technology-in-practice lens and understand the role of creativity in using the technologies.

Our data collection process is based on direct observation of the field and interviews. To understand the nature of the work in the radio industry and respond to our research question, we have gathered articles from and on the radio industry. We first conducted exploratory interviews with experts of the field. For this, we did direct observation during 10 days, and conducted semi-structured interviews with 10 employees and 2 with managers in the firm. All interviews were recorded and transcribed. For our observation, we have created direct observation parameters, enabling us to gather more in-depth data from our intervention. In doing so, we have divided the projects into three phases, before, during and after. In each phase, we have looked at the technologies which are used and the work which is accomplished in using these technologies. For each phase of the project, we have interviewed the key employees involved in the project and we interviewed them over the three phases.

The first round of interviews are warm-up with the subjects, and we tried to get a sense of the project, team members, the technologies involved and the way they envisage to creatively conduct the project. The interviews towards the middle of project focused more on the advancement and chronological issues of the project with respect to its initial subject and the creativity of the research in relation with the technologies used. In addition, we investigated the actual use of technologies in relation to the prescribed use of the technologies available to them at the beginning of the project. In other words, we investigated the new forms of technologies used in this project in order to accomplish the creative work of the player and the changes that happen over time. In the third round of interviews we concentrate on the overall project accomplishment and trace the use of technologies from the beginning to the end.

We conducted a qualitative study enabling us to understand the role of creativity on the use of technology. As Ritchie & Lewis observe (Ritchie and Lewis 2003), a qualitative research enables an in-depth understanding of the social world of the participants, and it helps to identify implicit and explicit rules surrounding their environment. Second, it is based on data collection methods that create direct and close contact between the researcher and the participants, which encourages rich, detailed exchanges.

5.5.2 Process of Analysis

We therefore have several sources of data: one is from the interviews, the second is via the observations we made while being in the setting of the radio industry and taking field notes; and the last one is the documents we obtained from the company. At first, we created an inventory of the data and shared it among our research team.

We transcribed all the interviews. They were conducted both in French and mainly in English. We started analysing the interviews by searching for the use of technologies in the processes involved in the radio project. We added observations about creative work and the technologies involved to this file as we read the transcribed interviews. We started coding by highlighting the themes that are elaborated. The themes are explored across the data in different interviews and from observed data and documents in order to identify the role of creativity on technology use. Should a clear over-arching theme emerge, we return to the data to identify the missing parts and find a deeper appreciation of it.

5.6 Analysis of data

Our analysis of the data revealed how individuals use technologies differently in their creative work and their experience with technology. New software is deployed in the

radio stations, new ways of conducting work, and these are re-structuring the work flow and communication flows that are observed in the radio industry. The era of analogue radio is over as the industry has moved towards the digital radio. However, going to digital radio differs from one company to another and the pathways can be different. Indeed, the materials and equipment become digital and this translate into computers for production, diffusion and information sharing. Therefore, in our analysis, we look at the technologies and experience of use of technologies in the radio company via functionalities of technology, which illustrates the employees' interpretation and understanding of technology and their use of technology based on their creative work.

Employees start by exploring the technologies and understand what technology can offer them and what it cannot do, within their work context. There are various discussions around the use of technology, how technology facilitates their work, how technologies create a learning environment for them with new ways of communication, easy access to the information and possible increase in their autonomy at work. Each person has his or her own level of absorptive capacity (Cohen and Levinthal 1990) to understand the features that technology brings for him/her. According to one of the interviewees: *"... basically we start with that and of course we're taking into account the client business requirement, the business objectives. So our creativity starts where we're trying to match business requirements, what we imagine as users requirement and our technological capacity. We have good expertise of technologies available to us, and each of us in the team has specific expertise for the business requirement of our client. We negotiate with the client to understand their business needs and we see what we have in our technologies and our expertise to make it happen. Sometimes, things are not that easy and not all of us are aware of what we can do. We have lots of discussions in the company within us to see the perspective of our developers with respect to technologies and our capacity to develop the business needs...* ". This can lead to a

new application to a technology which was not prescribed or even thought of before, as we observed. The type of negotiations around and within the use of technology to twist and tweak the technology and use it differently creates new uses and practices towards technology in various steps.
To make things clearer, we divide our analysis into two groups of proposition.

5.6.1 Creative Use of technology is redefining communication and information flow

The actual use of technology, Technology-in-use, changes the flow of information and communication among users. The technology brings an increase and expansion in the flow of information among and within the organization. Each project in the radio organization has a project lay out, project spectrum, and wikis are created to help and improve the sharing of information. Technology has redefined communication and information among groups of peers in the organization and makes it faster to get information and access to the information. Reading emails, getting information from wikis has become an important part of each project. In our case study, the users created an internal wiki where information is shared for the employees of the organization. According to one of the employees:

".. We have a wiki called Confluence. It's a kind of Wiki, like a depository of projects and we document all the projects there. We are not very strict about what should be documented for each project. There is some information, mostly on the programming side, that are actually documented for each project. It is like the pool of information available for everyone to access. We record the projects there and everyone has access to them if they need to know what has been done and how it was done etc..."
The project report is also available on the wiki for the rest of employees. However, the tacit memory plays an important role. For example, one of the employees mentioned that:

"...We meet and then we say what the weak points of the project were: the mistakes we made, what didn't work, how can we correct it for next time. Then we list the positive points of the project, what we learnt from this project we can apply in future projects. We keep that, we archive everything that made all projects. But I think mostly in effect, it's more the memory of the individuals from each perspective that really makes it work for all projects. "Ok, I remember we did this player for this client and it had similar profile, why don't we go back to the feature set that we wrote then" ..."

Although everything can be available to anyone for the project internally, tacit memory of individuals play an important role in knowing what to look for, and in creating and constructing the next project based on the previous one. For example, one of the employees mentioned that:

"...- In reality it's all tacit. I mean, we document for sure but for each project, do we go back to all the projects we wrote down and saved in files and directories, no. We proceed by human memory: "Remember we did this, we could use this feature again with that technology". And then we go back and find the doc we go back to our wiki and we go back to what we have done before. For example, for a lot of projects, I don't start from scratch writing specs, I would copy what I did for another project and start with this and then I would add them, I would subtract them and then start building something that at the end might be totally different..." "...we explore the possibilities and then we do a kind of filtering down to get the best options available to use with respect to technologies and expertise that we have, all taking into consideration the business needs of end-user (client)..."

Communication is also a key issue between the client and the company. The communications between the client and the company are circulated electronically and

all parties, both internally and in the company have access to the information. Use of technology redefines the way they communicate, which is a form of creativity.

The communication and negotiation between the client and the company is the key issue in the creative process. One of the interviewees mentioned the use of communication and negotiation via a different angle:

"... In some cases, we came to the client with ideas that we propose. And once the discussion starts, it's an exchange between us and the client. We propose ideas and the client kind of reaches the ideas, pushes them further. Or we receive ideas from the client and we push those ideas further. In the meantime, we see what we can do with our technologies available to us and the expertise that we have. If we can do it, we do it. If not, then we see how we can explore new possibilities with our expertise and technologies available to us. All that is basically communication between client and us in a recursive manner. It's a very constructive conversation that we have with the client. So in terms of creativity, I think at this point it's a co-creativity, it's a co-creative process, and it's very interesting. We're responsible for writing down, I'm responsible actually for writing down the result of those sessions, the result of this negociation process, and we share everything on our wiki for this current project and other future projects..."

5.6.2 Creative Use of technology is restructuring the work, using technology in a smarter way

Technology enables individuals to work in a smarter way by restructuring how work can be performed. The technology does not necessarily change the nature of the work but it rather transforms the flow of work. Individuals use available technologies effectively and efficiently to accomplish the work and also to organize the work. There are plenty of technologies available to them but they use their creative thinking

to modulate their work. For example, one of the employees mentioned that in some cases:

"...we take technology as it is but we just modulate it differently. We know, for example, such a script, such a functionality that exists, but we combine it with another functionality then we create something new..."

Combining known concepts or exploring for an unknown concept is a key issue in a creative process (Dewett 2003) and this changes the use of the technology. In doing so, trial and errors in the re-structuring the creative use of technology plays an important role. For example, one of the employees mentioned that:

"...it's trials and errors. We try things that don't work but maybe we can do this instead. There are a lot of trials and errors, there's a lot of brain storming sessions, we do something..."

Or

"...We have various technologies available to use and we do all sort of iteration with the technologies to come up with a product..."

Moreover, there are technologies which are available and the functionalities are well known. However, over the course of the creative process, users push the technologies further. By pushing, they mean that they change the use of the technology which was not known before. For example, the programmers, they use various technologies in programming the software in the radio industry. One of the employees mentions that:

"..."Pushing" is like hacking, you take a feature and the original purpose of the feature, you take it all away and you bring it back another way. This is maybe more on the programming side than the design. Programmers are also creative in their own way. Sometimes there is a step and that's where they become creative. There are steps that they don't wanna be stuck in, they work hard so they find a side way to get to the result. So it's focused on result. I think we're focused on results more than

methodology. So we focus on the vision that we have, that we want to obtain and the means to obtain it. It's up to each man to find a way ..."

Moreover, during the creative process, they push technologies as much as they can, but it is also the resources which play a role and sometimes limit what can be done. For example, one the employees mentioned the following:

"We also push technology as much as we can. But sometimes, it's not technology that resists; it's more the administrative structures or the people in place, who are in charge of those technologies. Yes, you could push it that way but you won't because the holder of the technology says "I don't have the resources to make the modifications that you're asking for. Yes, it's technically possible but I won't do it."

Therefore, not only pushing the new use of technology changes the use of technology, but also will ask for new administrative resources and therefore changes the structure of the work.

Beyond pushing, is the risk taking, it is tweaking the technology which plays an important role over the period of time. One of the employees mentions that if they have time:

"...we go deep, we tweak more, we research more, we test more, we try some things, we allow ourselves to be more difficult, more demanding..."

At the same time, the absorptive capacity of individuals plays an important role in knowing the technology and getting the ideas to move forward over the creative process. One of the employees mentioned that idea generation and absorbing new ideas will help in design of the new product:

"...Other ideas either fit with the scheme of work, so you're able to absorb entirely. Or there's a negotiation: "This is your idea, I take this from your idea but I don't think this will work". And then there's always negotiations forms, "I take part of your ideas and you take some of mine" and eventually we meet at half way or when we're both satisfied. Ideally we would be both satisfied. We work to be satisfied in life so we reach that point where "I'm ok with this, you're ok this? OK". And we both think that is the best thing we can do."

The analysis of post-mortems, after projects, gave us an important understanding of the work process and the creative dimension pertaining to it. The radio company does cyclic projects; and as a result of the nature of cyclic projects, after each project there is a post-mortem as a way of getting feedback and sharing the advantages and disadvantages of the project.

After each project, the members of project get together and go back to the initial document which was the project plan. One of the employees mentioned that:
"...So we all meet and we go back to the initial document which was the project plan. Basically we look at the project, how did we define the project versus how did we deliver the project. So in the project plan you have time line and budget, and requirements for the client, what the client asked to be delivered. So we look at all that we planned, did we deliver on time, did we deliver what was expected, did we deliver respecting our budget in terms of hours worked versus hours planned, has the client done his part as planned as well, if not what could be corrected next time, should we allow more or less time for such activity?..."

5.7 Conclusion

Within the radio industry, technology has been widely used and has changed the current work practices. Users use technologies differently to achieve their goals. Creativity in tweaking the functionalities, pushing and iteration of use plays an important role. Using a social construction lens, immersion in the daily life of the users, and conducting interviews enabled us to see that the technology is used differently from what has been prescribed by the initial technology designers. Designers get the ideas from other peers, integrate them, push and tweak the technologies to create new functionalities for the end-users. Creativity in tweaking the use, the use which was not defined before plays an important role. Interaction and communication while sharing information are also very crucial. Encouraging employees to construct and share their understanding of technology and its functions and capabilities enables learning over the time and also changes the perception of technology use among employees. We understand that absorptive capacity is part of creative use of the information technology. It shows the degree of understanding, being able to absorb new functionalities and capacities of technology which eventually will be incorporated in the use or a new use of technology. While users use the technologies, they tweak the technologies to attain the new functionalities which are not known in the technology initially. By doing so, they sometimes reach a point where it is not the technology which is not changing or letting people change it, it is the administrative resources which are resisting. Therefore, if possible, users will need to challenge the administrative resources and either acquire other or more resources or make administrators change their vision. In this vein, the use of technologies not only changes the technologies itself, but also changes the way the work is done.

Creative use of technologies in the creative process is an on-going questioning process on how users can create creative novel things with existing resources and find new resources in order to create novelty.

To conclude, let us mention a few limits of the study. As it is innovative in its theme, Creativity and technology, we need to do more research to confirm our observations here. We only studied one firm, although in great detail, and would therefore need to do work on other firms. We also studied the radio sector, and this is another limitation; in future work, we would like to look into other sectors, digital media, gaming or others to test our observations in these other sectors. Nevertheless, we think we have contributed new ideas on creativity and technology, particularly including the concept of absorptive capacity as a source of mediation in the creative capacity of individuals in a given context.

CHAPTER VI

DISCUSSION

In this part of the dissertation, we discuss our academic contributions based on the findings that are presented in the three above articles. Although we have presented the discussion sections in all three articles, it is important to elaborate more in this final discussion. This section of our thesis starts by discussing the first paper, followed by a discussion of the second and finally the third. Finally, there is also a general discussion on the general contribution the dissertation.

6.1 Theoretical Impacts

6.1.1 Article I

In this article, we have studied the literature on creativity and information systems. Based on the analysis, we found that the relationship between creativity and information systems has been studied mainly from the variance logic, where the information system has been considered from the positivist perspective. Therefore, in view of the existing problems with variance logic, notably considered from the studies of Orlikowski, we discussed a new vision of creativity studies in IS by considering the process happening between creativity and information systems. We discussed that there are inter-connections between creativity and information systems and their impacts on each other are embedded, emergent and there is no determination in advance on how and what happens in the relation between creativity and information systems. This new logic enabled the ground of our 2nd and 3rd

articles by looking specifically at the interactions with the use of case studies in the context of creative industries.

6.1.2 Article II

In this article, we have analyzed in more detail the impact of information system and information technology on creativity. In this vein, we have discussed the published papers within the IS discipline which have already studied creativity and information systems. Our first contribution was to classify the existing literature on the impact the information technology has on creativity. In this proposed classification, we have given two distinct sections with few sub-sections. The 1st category is theTransmissive impact that IT has on creativity. Within this impact, we identified a few subsection; codifying, accessing, combining, exploring, tracing and retracing, and finally sharing. All these sub-categories are driven from the existing literature on the relationship between creativity and information systems. The second category is under the title of Interactive. In this category, we have classified the literature in IS under contacting, ex-changing and coordinating.

Moreover, we have studied this categorization based on Orlikowski and Scott (2008) to understand under which logic the various contributions reside. Based on Orlikowski and Scott (2008), the studies on technology, and the impact of technology in organizations are found under two logics. The authors have extended the literature by proposing a third category. The categories are variance logic, process logic and third proposed category is relationality.

Our analysis on the existing literature posits that our categorization, depending on the epistemological ground and definitions given to the technology, reside under variance logic, which is considered a positivist vision, seeing technology as a deterministic approach.

Therefore, we have used the case study of the carnival-ethnography, in creative industries, to elaborate more and extend the literature. We have adopted the process logic study to understand the impact of technology on creativity. Before discussing the findings of this research, it is important to draw upon the nature of creative industries and how they consider themselves as creative.

We have examined the cultural-creative industries, which have creativity as an inherent part of their existence. The Creative Task Force Mapping Document (CITF 1998-2001) in the UK defines creative industries or cultural industries as 'activities which have their origin in individual creativity, skill and talent and which have the potential for wealth and job creation through generation and exploitation of intellectual property'. The Carnival of Quebec is part of the creative industry which operates in a project-based context (Defillippi, Grabher, and Jones 2007).

The carnival as a project-based organization has occasional and episodic aspects which are important for the continuance of creative works and attraction of more people to the next event. The discontinuous and episodic nature of creative and cultural industries impact the production of each offering (each year's event), from one edition to the next, and are neither continuous nor standardized (with no repetition from one event to the next). This suggests that some types of creative or cultural industries need to find dynamic balance between preserving the cultural characteristics and the extent of the creative work to attract a maximum number of viewers over time, which gives rise to a heavy reliance of technology to create novelty. On the one hand, the episodic nature of ccreative/cultural industries requires some degree of consistency between the past and the new edition; and on the other hand, new editions need to be different or fresh enough to attract new viewers, especially repeat visitors who would not return to view the same old performance, time-after-time. The optimal balance between the two is achieved with the help of

internet-based technologies (IBTs) in general and the information systems (IS) in particular. It suffices that with interactive and transmissive use of technologies, the employees of the Carnival, capture and use the information that is necessary for deriving the above dynamic balance and also provides sufficient information to enable a thorough and objective evaluation of a performance or exhibit against other competitors.

6.1.3 Article III

In the third paper, we discussed the impact of creativity on the use of technology, technology-use. Many scholars, including Orlikowski, have studied the anti-positivist use of technology. In other word, it is technology-in-use which illustrates the actual use of technology in the organization and not the technology use which was prescribed by the designers of the technology. In this paper, with the evidences from the empirical data, we have given a new vision on the issues of technology-in-use and technology-in-practice, which is the result of creative use of technology in order to re-shape the technologies and give a new use to technologies.

As mentioned in various parts of this thesis, creativity studies in IS discipline have been overlooked over the past years. Although many researchers have mentioned the need to further the study of creativity in IS discipline, all the more so as it is much studied in management studies in general recently, there is not much of empirical research on the creativity studies in the IS literature. Based on our research, we can see that there is no study in the IS discipline which has looked at the impact of creativity on the use of technology.

In this research on a radio company, we have studied this impact through the lens of process logic, where we have studied a radio design player company over the course of time. Our empirical data and our analysis posit that creative use of technologies is

through tweaking, testing, pushing and making a smarter use of the technologies. We have presented two distinct themes under which creative use of technologies happens. First of all, the use of technologies redefines the communication and information flows in the organization. Indeed, creative use of technologies enables information flows and communication flows in the organization. On the second theme, we have concluded that technology is redefining the work, using the technologies in smarter way.

What we have drawn from our analysis shows that users employ technologies in various ways. There are plenty of features and modules which are available to them. However, creative use is not a single use or something which is prescribed. Creative use of technologies is tweaking, and pushing further the technologies. Users employ their creative thinking on how they can re-shape the use and create something novel, create something which was not done before. By modulating the technologies, while knowing the features which are available to them, and while having expertise which is accumulated over the course of time, and their expertise integration, individuals modulate the technologies and create a new use of technology.

This process of modulating the technologies does not come quickly; it comes with trial and errors, and discussions which are around the use of technologies. The iteration of technologies is essential throughout the new use of technologies. Users push technologies as much as they can. Also, as we observed, sometimes it is not the technology which resists, but the administrative limitations and structures of organization that make it impossible to push further. In some cases, we could envisage the restructuring of the organization to make this new push, hacking and tweaking of technology possible, but it may also be financial limitations that at some point make it impossible to go further.

6.1.4 Intertwinement of Processes: Technology and Creativity

Based on our studies, articles I, II and III, we defend the position that creativity should be considered via the social lens and contextual basis. In doing so, and similar to views of Amabile ,Csikszentmilhaly (1999), as well as Stenberg and Lubart (1999), creativity can be best studied via the social processes and contexts in which the creative work is happening. Technology viewed from the process logic, is also by all means a social process in which the use and the process of use is understood on how the technology has been incorporated in the daily activities of individuals, groups and organization over the course of time.

We have discussed earlier in the articles that there is the process of interaction between technology and creativity which the creative work can happen and also this interaction is not pre-determined. The aim of this dissertation, in terms of theoretical impact is to move further the discussion and introduce the process of intertwinement between the processes related to creativity and technology. According to the Oxford Dictionary, the word 'intertwine' has the significance of connecting or linking two or more things more closely. Or in another meaning, it is the issue of twisting or twinning two or more things together in such a way that they become one. For example, 'a net made of cotton intertwined with other natural fibres' creates a new type of cotton with an ensemble of different ingredients.

In discussing the intertwinement of these two processes, we would like to propose the use one metaphor, the game of curling, with the concept of creation of social process, or social place (Lefebvre 1991). In order to understand the social process, or the creation of space, we shall investigate on the roots of sociology of space (Lefebvre 1991). The sociology of space is an inter-disciplinary conception, which is illustrated in understanding of the social practice, institutional forces, and material complexity of how humans are interacting with the space (Lefebvre 1991). There have been various definitions attached to space. Michel Foucualt considers the space as 'the

space in which we live, which draws us out of ourselves, in which the erosion of our lives, our time and our history occurs. The space that claws and gnaws at us, is also, it itself a heterogamous space .We live inside a set of relations' (Kahn 2000).There have been attempts to consider the duality of space; for example, Löw (2008), has developed the idea of relational model of space by focusing the on the orderings and social goods. As per her, the term ordering denotes two aspects: both the static order created by the spaces and the procession ordering, the action dimension. It is important to understand how the space is constructed, constituted over the course of time. So what is important to retain is that spaces are created by agents and their actions and that is been constituted in the process and over the course of time.

Figure 11: Game of Curling

Taking into the consideration the curling game as the metaphor (Figure 11), we consider that the social place is created in the arena of curling game. Reaching the ending point is also considered as creating something novel and hit the records of before. Therefore, in each creative work, there is a continuous novelty to take place. Each time the ball is rolled, the players try to achieve the highest score, win the game and hit the previous records. Therefore, although it is project-based, it is not the same as the previous game and the initiatives to pave the way for the ball to role in the appropriate direction are different from the previous game. There are few flows of processes in this arena:

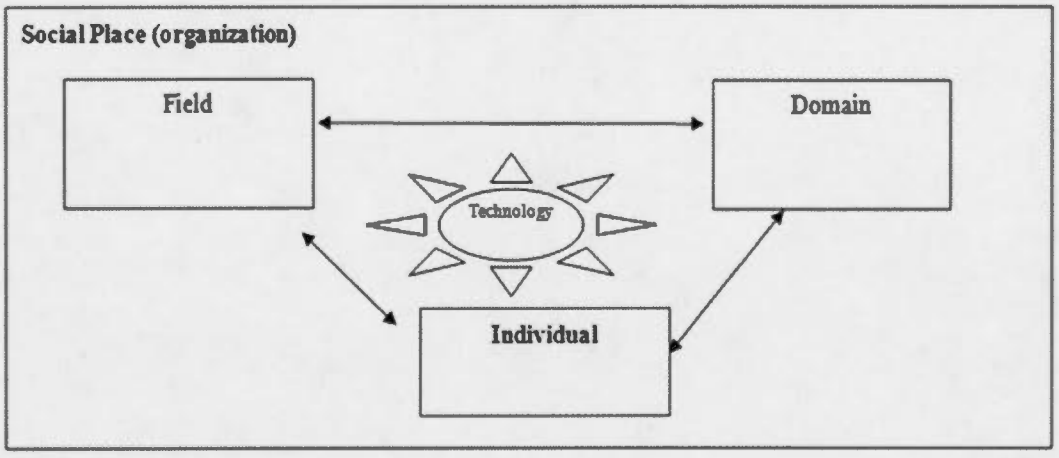
- The first one is the presence of spectators in the arena and their applauses to enchant their favorite teams to achieve and make the work done.
- The second process, is the interaction between plays of each game, they create a co-creation to achieve novelty and new score.
- The third process is the process of time, from the point when the game starts until the ending point.
- The forth process, is the game path. This path is not fixed; it can change by the way players are using their tools, shuffle-boards, to pave the way for ball to reach the ending point.
- The fifth process is the presence of coaches, to lead, train, analyse and make the information available for them for the current game and also for the future games.

As mentioned, the creative work takes place in each time of the game, but no game is the same as the previous one. None of these processes can be taken apart. Their being and their existence are subjected to the presence of this social place, the arena. In other words, we cannot take one process out of the game and make the game happen. They are not separate entities, and they constitute a mutual ensemble with continuous interactions. We call upon these interactions as intertwinement, as they are all

necessary to create a creative work happen and the processes are not only inter-related, inter-dependent, but intertwined, and they constitute the game of curling.

Taking into consideration the conceptual synthesis of social creativity proposed by Kuo (2011), which is inspired from the 'Systems Model of Creativity' proposed by Csikszentmihalyi (1998) proposed that there is an interaction model, and the creativity is a product of the dynamic interaction three dimensions, individuals, domain, and the field. Based on this Model of As we have seen with the results and analysis of our case studies in this thesis, we push further the model of creavitivy by taking into consideration the ensemble of these processes in the social place as discussed by (Lefebvre 1991). In this model, the creative work happens in the social place, called the organization. And the interactions are intertwined together over the process of time to give way to novelty, and to creative work. The intertwinement between field, individual, and the domain is present to make the creative work happen (Figure 12). The process of technology-use is not only part of the domain, but also part of the field, and also part of the individual's knowledge, personality, thinking style, intellectual abilities and etc. In other word, the process of technology-use is not only in each part, but also it is present in the social place used by everyone to make the creative work happen.

Figure 12: Technology and Social Creativity



6.3 Impacts for Practice

In addition to the theoretical impacts of this research, we believe that there are also impacts for practice which could be taken into consideration in the world of business.

1) The first contribution is discussing the fact that in each organization, there is no predetermined factor that determines how creative work can happen and how individuals can use the technology to create something novel. Over the course of creative work, the technology can be used as the means of knowledge sharing and giving access to individuals in the company, and there should be motivation for the individuals to use such technologies. Individuals can deliberately use the technology in their organizations over the process of their creative work.

2) The use of information systems opens era space of autonomy for the users, who can use it as they want, when they want and how they want. In doing so, they have the capacity to access the information throughout their creative work.
3) Managers and the project leaders should encourage the employees to document as much as they can on what they have done and what they are doing. Sharing these information is essential for the rest of group and circulating these information via their close-internet circuit is enabling. It is all the more important in the IT sector, as there is a lot of mobility of workers from one firm to another.

CHAPTER VII

CONCLUSION

7.1 Introduction

This thesis work is based on the format of three articles as an alternative format of the traditional thesis.

In the first paper, we have highlighted the importance of creativity studies in the IS discipline and we have discussed that although creativity and technology have been widely studied in the literature, their relationship has been overlooked in the IS literature. We have investigated the trends of research which was present in the IS discipline by looking at the impact of technology in organization, from variance logic, process logic and more recently from the relationality logic. This paper provides a repertoire of research strategies that can be done on the relationship between creativity and information technology which have been highly neglected in the literature and which we propose to develop in future research in IS.

In the second paper, we investigated further this relationship between creativity and information systems, centering on the impact that information systems have on creativity. In the first stage, we classified the existing literature on this impact, and we proposed this classification under transmissive and interactive categories which enable creativity. Further, we discussed that this classification on the existing literature considers the technology from the tool view, which is under variance logic or considering the impact of technology pre-determined. We adopted a different angle

of research by conducting an ethnography study to understand this impact from the social process view and we have concluded that not only technology impacts the creativity from transmissive and interactive but also creates a new type of impact under imaginative.

In the third paper, we have the impact of creativity on the use of technology. The argument is that many scholars have studied the technology as the actual use of technology, but none have studied what creativity does in terms of changing or tweaking in the use of technology. In this paper, we discussed this issue based on two themes which illustrate how creativity impacts and re-shapes the use of technology. We have further discussed the impact of creativity on the use of technology on the basis of two different themes, creative use of technology as redefining communication and information flow, and creative use of technology as redefining the work, using the technology in smarter way.

7.2 Further Contributions of this Research

The very first contribution of this research is to push further the understanding of creativity in the IS discipline. Many other human science disciplines have studied creativity by means of various epistemological grounds, but in the IS discipline, there has been a relatively narrow view of creativity. We have discussed further the concept of creativity in this discipline and put more emphasis on this concept by looking at the process logic rather than variance logic. We believe this thesis gives more insight on this concept and opens up the concept of creativity in this discipline. This dissertation makes a contribution in three aspects:

Paper 1: It investigates the challenges of defining the concept of creativity in this discipline. It also contributes to the advancement of this research by opening the era of creativity and IS as process logic.

Paper 2: It gives a new breakdown of the impact of IS on creativity in the present literature and by conducting an ethnographic study, it shows new impacts of IS on creativity from the process logic. In addition, it proposes new methodological avenues. We have conducted the ethnography by means of audio-visual tools which could be later discussed and investigated for future papers, to present a new vision on IS by conducting audio-visual ethnography, which to our knowledge has never been done in the IS discipline. Further, it suggests an emergent and promising qualitative approach to investigate social phenomena of IS and creativity.

Paper 3: In this paper, we have analyzed creativity in the use of technology. Many studies in the past have analyzed the IS from the social, process and technology-in-use perspective, but none has studied the importance of creativity in the use of technology. Therefore, not only it is a new discussion in the IT field, but it also opens up to the analysis of new social phenomena related to creativity which also open new perspectives for the analysis of the use of technology. The issue of absorptive capacity was also presented, although in a limited space due to the article format, but we consider this an important dimension, to be pursued in future research and possibly another article from this study more concentrated on this theme.

In addition to these paper-based contributions, this thesis contributes to bringing new fields of analysis to the IS discipline and also to bring the IS discipline into the creative industries analyses, something which has not been done much. Creative industries as context have been widely neglected in the IS discipline, whereas the use of IS in such industries are prominent. It is important to develop the analysis of the use of technologies in those industries, as it has not been done much to date. With the

constant availability of new software for design and implementation, creative industries have adopted them and incorporated them into their work. It is important to discuss and open the creative industries as acontext to conduct research and understand what happens to IS and its relation in the high- creativity-intensive industries known as creative industries.

7.3 Limitations of research

As all research, this research presents some limitations, which also can be open up new directions for future research.

First of all, as mentioned earlier, the concept of creativity has been widely used in various disciplines, but only a narrow version of it has been studied in the IS discipline. This means we are at an early stage of creativity studies in this discipline and there are few works to compare our own to. From another perspective, we can consider that this opens up avenues for future research.

Second limitation, this has to do with the level of subjectivity of the researcher involved in any qualitative method (Harker 1999). There are issues with generalizability attached to the qualitative method, which are associated with the level of subjectivity of the researcher, access to the field, as well as dependence to the field etc. (Yin 2009). Qualitative methods used in this research have been a useful approach, enabling us to describe and illustrate the process logic of creativity and IS. However, these methods are not well suited for the generalisation of certain concepts across different contexts and frameworks. In order to avoid the limitations given by the qualitative methods, quantitative methods could eventually be used to test our hypothesis on broader populations in more contexts, but again, this may be difficult

with the subject at hand. We first need more qualitative studies before any quantitative study can be envisaged.

The third limitation is the fact that we did not address the cultural dimensions in the use of IT and encouragement of use of IT in the organizations. This dimension had to be left unattended due to the already extensive topic of the dissertation, and particularly the two extensive case studies, done in two cities of Québec, but where different cultures may have been at stake. Cultural aspects and organizational culture are very important in the organization as they determine if users of IT tools can do so quite freely or not. Therefore, future studies could give more attention to the cultural aspects of the organization and managing creative people in the organization. This is an avenue of research we could also envisage to pursue.

Fourth limitation would be the time and access to the field. In the case of Quebec City Carnival, we were given extensive access to the field, however, in the case of radio, the company was very busy and we were given a more limited access over a more limited period of time. It may have been more suitable to conduct identical qualitative methods, i.e. ethnography, in both organization, which would have been much deeper and allowed more follow ups for further research in the future. However, our interview guide was well developed and we had many returns with the people to pursue questions that came up from the first transcriptions.

7.4 Future research

7.4.1 Creativity and IS from Socio-materiality perspective: Logic of Relationality

In this study, we have looked at the technology-creativity relationship from social processes. However, Orlikowski & Scott (2008) have classified technology under three research streams: under social structure of variance, process and relationality.

We have classified the literature under variance and we have extended the literature with the process lens, and the social process dimention. However, there is a third stream of research which is open to consideration which is the relationality perspective; this would lead us to look at the socio-materiality in information technology. Since creativity is highly linked to materiality (Jacucci and Wagner 2007), and the creativity appears with interaction between the material within the social context, this would be an important avenue for future research, i.e. to study creativity and technology from the socio-materiality perspective.

7.4.2 Aesthetic Creativity and Sensory Ethnography in IS

Many researchers consider that there is an aesthetic aspect related to creativity (Drake 2003). Aesthetics theories are rooted in the litterature of philosophy and human sciences, especially from William James (James 1956), John Dewey(1958) and Merleau-Ponty(Merleau-Ponty 2013, Crossley 1995), in which they discussed how aesthetic knowledge can be perceived as the foundation of individual , collective beliefs, creativity and practices. Considering creativity-technology as social, it would be interesting to study this via the sensory ethnography. Based on our research, there is no research in the IS discipline taking into consideration the sensory ethnography. It would be an interesting topic to introduce this ethnography to study the creativity-technology relationship by incorporating the sensory ethnography elaborated by Pink (Pink 2009). In this ethnography and in contrast to classical ethnography, not only is the ethnographer's body an important source of knowledge but the ethnographer uses his own embodied sensorial experiences as a means of conceiving and understanding other people's experiences, ways of knowing, and sensory categories, meaning and practices (Tafreshi 2012, Pink 2009). In this ethnography, there are definitions attached to sensory place (considering both ethnographer and participants are emplaced in social, sensory and material context), sensory memory and sensory imagination (Tafreshi 2012, Pink 2009). This could be used in the future to approach

our objects and themes, but this would require a better grasp of this type of research process, which is not simple.

7.4.3 Studying Creativity- IS with Visual Qualitative Method

Another future research that could bring both theoretical and methodological advancement in the field of IS and also in Creativity-Technology studies would be to conduct a more extensive visual qualitative study (Pink 2007, Jon Hindmarsh 2007, Heath and Hindmarsh 2000). Attractiveness and novelty of creativity could possibly be better understood by using a visual methodology. We have gathered an important number of video files during our study for article II, and we consider using them in more detail as preliminary data for such a future study.

APPENDICES

Appendix 1: Definitions of creativity and Conceptual Categories

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
A creative solution is a resolution to a difficult problem. Boyer (1990)		solution, resolution				
Bringing something into being that is original (new, unusual, novel, unexpected) and also valuable (useful, good, adaptive, appropriate). Ochse (1990)	original, new, unusual, unexpected, novel, valuable, useful, appropriate, good, adaptive		bring something into being			
Creativity is a generative or productive way of experiencing reality. Smith and Carlsson (1990)		experience reality	generative, productive			
Creativity is fluency, flexibility, originality, and sometimes elaboration. Torrance (1990)	originality	flexibility, fluency		elaboration		
Creativity is associated with problem solving and creative thinking. Kebanoff et al. (1991)		problem solving, creative thinking				
Organizational creativity is the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system. Woodman, Sawyer & Griffin (1993)	valuable, new, useful		creation		working together	
Creativity is the achievement of something remarkable and new, something which transforms and changes a field of endeavour in a	remarkable, new		achievement	transforms, change		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
significant way. Feldman (1994)						
Creativity has to do with "solve problems, fashion products, or pose new questions within a domain in a way that is initially considered to be unusual but is eventually accepted within at least one cultural group". Feldman et al. (1994)	accepted	solve problems, pose new questions	Fashion			
Creativity is a special class of problem solving characterized by novelty. Newell, Simon & Shaw (1994)	novelty	problem solving				
Creativity is having the ability to creating things, showing imagination and originality. Oxford paperback dictionary (1994)	originality	imagination	Creating			
Some degree of creativity occurs whenever people solve problems for which they had previously no learned or practiced solution. Creativity is the process of sensing problems or gaps in information, forming ideas, testing and modifying these hypotheses and communicating the results. Torrance (1994)		solve problems, sensing problems	forming ideas	modifying	Communicating	
Creativity deals with the generation of alternatives and ideas that can be used in the problem solving process. Creativity is changes in perceptions and concepts. De Bono (1995)		problem solving	generation	Changes		
Creativity is the	useful,	heuristic	Initiates			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
process that initiates a product or process that is useful, correct, appropriate and valuable to a heuristic task. Dollinger (1995)	correct, appropriate, valuable	task				
Creativity is located in the interaction between the creator and the field's gatekeepers who selectively retain or reject original products. It may be useful to think of creativity as a form of persuasive communication, in which the creator is the source, the original product is the message, and the judge [gatekeeper] is the recipient. Kasof (1995)	original				interaction, communicati on	
Creativity is playing with imaginative possibilities, leading to new and meaningful outcomes while interacting with ideas, people and the environment. Lumsdaine and Lumasdaine (1995)	new, meaningful	imaginative			Interacting	
Employees believe they have the freedom to generate new ideas and creative ideas and "think outside the box," and that their creative contributions will be accepted and appreciated. Robert & Yan (1995)	new, accepted, appreciated	think outside the box	Generate			
Creativity is defined as behavior that results in identifying original and better ways to accomplish some purpose. I defined individual creative behavior as developing solutions to	judged original, novel, appropriate	identify better ways, solutions to job-related problems	Developing			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
job-related problems that are judged as both novel and appropriate for the situation. Shalley (1995)						
A product or a response is creative to the extent that appropriate observers independently agree it is creative. Appropriate observers are those familiar with the domain in which the product was created or the response articulated. Thus, creativity can be regarded as the quality of products or responses judged to be creative by appropriate observers, and it can also be regarded as the process by which something so judged is produced. Amabile (1996)	appropriate observers agree is creative, quality of products judged creative		produced, created			
Creativity is the generation of new and useful ideas concerning products, services, processes, and procedures in organizations. Amabile et al. (1996)	new, useful		Generation			
Individuals in a highly focused state of consciousness take new perspectives and reassemble interrelated parts of a system in novel and unusual ways leading to viable solutions. Csikszentmihalyi (1996)	novel, unusual, viable	take new perspectives, solutions, reassemble part of a system				
Creativity is the missing link between context and innovation as outcome. Pure creativity is cast as freedom from	innovation as outcome	Enterprise				

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
distraction, and the ongoing enterprise as the major distraction. Drazin et al. (1996)						
I define creativity as a domain-specific, subjective judgment of the novelty and value of an outcome of a particular action. Ford (1996)	novelty, value, domain-specific, subjecive judjement					
Creativity involves divergent thinking, which is the tendency to present solutions that move away from established ways of doing things. Mumford et al. (1996)		divergent thinking, present solutions, move away from established ways of doing things				
We defined creative performance as products, ideas, or procedures that satisfy two conditions: (1) they are novel or original and (2) they are potentially relevant for, or useful to, an organization. Further, we consider a product, idea, or procedure novel if it involves either a significant recombination of existing materials or an introduction of completely new materials. Oldham & Cummings (1996)	novel, original, useful, relevant			recombination, introduction of new materials		
Creativity in particular is associated with highly intrinsically motivated states, called "ecstasy" and "flow" in which total involvement in the task at hand results in loss of self-consciousness and the sense of time.						total involvement, ecstasy, flow

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
Csikszentmihalyi (1997)						
As a fitting thinking style for nonlinear systems, creativity is characterized by spontaneity and flexibility, with a balanced integration of rational analytic and unconventional imaginative processes. Katz (1997)	spontaneity, flexibility	thinking style, imaginative processes				
Creativity is a process of fit between individual and organizational factors that results in the production of novel and useful ideas and/or products that influences individuals' responses. Livingston et al. (1997)	novel, useful		production		Influence	
Creativity is bringing together knowledge from different areas of experience to produce new ideas. Creativity is not something limited to chosen few, it's a fundamental part of being human. All of us are naturally creative and intent new approaches to problems as we go about our daily life. Creativity involves us in the constant discovery of new and improved ways of doing things, it means challenging well tried and traditional approaches and coping with conflict and change which this inevitable causes. West (1997)	new	bringing together knowledge, discovery, improved ways of doing things, new approaches to problem	produce	Change		
To generate good ideas, creative thinkers depend on their prior	good	creative thinkers, knowledge,	Generate			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
knowledge and their ability to recognize its relevance when they need it, not just on their ability to combine and adapt ideas and distinguish good ideas from bad ones. Eckert and Stacey (1998)		recognize its relevance, combine and distinguish ideas				
Creativity is the generation of ideas whereas innovation is putting these into action by sifting, refining, implementing. Gurteen (1998)			Generation			
Creativity is taking something that perhaps you believed would never come to pass, declaring it possible and then working to make it a reality. Hargrove (1998)			working to make it reality	declaring it possible		
Creativity is the ability to develop new ideas, refers to imagination and to the ability to think originally and can be described as applied imagination or the Establishing of a new idea. It can be seen as an active, stimulating, uplifting process of growth towards an unknown unique ouput, achievement or creation in times of difficulty or opportunity. Kroon (1998)	new, unique, unknown	imagination, think originally, growth towards an unknown output	develop, creation, achievement , establishing			
Creativity is associated with creative problem solving. McFadzean (1998)		problem solving				
Mooney attempted to define creativity in terms of what is referred to as	what is referred to as creative					

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
creative. He considers four approaches: the creative product, the creative process, the creative person. Beattie (1999)						
Originality, freshness of perceptions, divergent-thinking ability are all well and good in their own right, as desirable personal traits. But without some form of public recognition they do not constitute creativity. I define creativity as 'a person's psychological engagement in creative activity'. Csikszentmihalyi (1999)	originality, public recognition	freshness of perceptions, divergentthinking ability				Engagement
Creativity is the process through which invention occurs, that means creativity is the enabling process by which something new comes into existence. Brazeal and Herbert (1999)	new	invention	comes into existence			
Creativity is a choice made by an individual to engage in producing novel ideas; the level of creative engagement can vary from person to person and from situation to situation. Drazin, Glynn & Kazanjian (1999)	novel		producing			Engage
Among theorists and practitioners alike, there is a view that creativity is something to do with processes that produce new and valuable ideas. Richards (1999)	new, valuable		Produce			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
Creativity is thinking beyond the box. Rickards (1999)		thinking beyond the box				
A commonly accepted definition for "creativity" is a new or novel idea, appropriate for its context, that creates value. Sternberg (1999)	new, novel, appropriate		Creates			
Being creative is seeing the same thing as everybody else but thinking in something different. Fillis and McAuley (2000)		thinking in something different				
Creativity should be defined as a socially constructed label used to describe actions embedded within particular contexts. Creativity is defined here as a domain-specific, subjective judgment of the novelty and value of an outcome or product of a particular action. Ford and Gioia (2000)	domain-specific subjective judgement, novelty, value				socially, embedded	
Creativity involves the production, conceptualization and development of novel and appropriate ideas, processes, or solutions. The definition of creative strategy or solution varies by the field or required creativity should affect job incumbents' job involved, but all creative behaviors result to some degree in identifying original and better ways to accomplish some purpose. Shalley, Gilson and Blum (2000)	novel, appropriate, original	conceptualization, solution, original and better ways to accomplish some purpose	production, development			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
Creativity is the ability to visualize, foresee, generate and implement new ideas. Hellriegel, Jackson and Staude (2001)	new	visualize, foresee	generate, implement			
Creativity is the generation of ideas that result in the improves efficiency or effectiveness of a system. Kuratko and Hodgetts (2001)		improved efficiency	Generation			
Creativity is the ability to consistently produce different and valuable results. Levesque (2001)	different,valuable		Produce			
Creativity is based upon novel and useful ideas, regardless of the type of idea, the reasons behind its production, or the starting point of the process. To enable prospective analysis, we need to categorize creativity based upon an individual's initial engagement in creative activity. Unsworth (2001)	novel, useful		production			Engagement
Creativity is the generation of new and potentially valuable ideas concerning new products, services, manufacturing methods and administrative processes and contributes to organizational renewal. Zhou and George (2001)	new, valuble		Generation			
Creativity refers to activities such as "lateral", "original" or "novel" thinking, exploration, experimentation and imagination as well as		original novel, lateral thinking, imagination, intuition, exploration,				

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
the more postmodern quality of intuition. Banks et al. (2002)		experimentation				
Early findings concluded that originality was an important dimension of a creative new product. Creativity results in the production of some novel output that is satisfying and represents a real leap forward from the current state of the art. Kristensson, Magnusson and Matthin (2002)	originality, novel, new		Production			
Creativity is the development of ideas that are unique or novel and are deemed to be useful in a work situation where the 'standard action' is not appropriate (Kylén, 1999). Guilford suggested four measures of creativity. Fluency is the ability to generate many ideas. Flexibility is the ability to generate a wide range of ideas. Originality is the ability to generate a novel idea. Elaboration is the ability to develop or embellish ideas (Guilford, 1967). This divergent thinking perspective helps describe a broad range of creativity. Kylén et al. (2002)	unique, novel, useful, appropriate, originality	divergent thinking	development of ideas, generate	Elaboration		
Creativity may reflect either a recombination of existing materials or an introduction of new materials to the				recombination, introduction of new materials		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
organization. Madjar, Oldham & Pratt (2002)						
Creativity is what emerges from persistent engagement within a field. According to Amabile, creativity is simply the production of novel and appropriate ideas, in any realm of human activities (...) the ideas must be novel different from what's been done before, but they can't be simply bizarre; they must be appropriate to the problem or opportunity presented. Prichard (2002)	not simply bizarre, novel, appropriate, different	problem	production			Engagement
A product or response is creative when observers independently agree that it is novel and appropriate, useful, correct, or valuable to the task at hand, and when that task is open-ended and appropriately carried out via discovery rather than via a predetermined step-by-step procedure. Taggar (2002)	observers agree, novel, appropriate, useful, correct, valuable	Discovery				
We consider employee creativity to be the production of ideas, products, or procedures that are (a) novel or original and (b) potentially useful to the organization. These ideas may reflect either a recombination of existing materials or an introduction of new materials to the organization. Further, creative ideas may be	novel, original, useful		production	recombination, introduction of new materials		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
generated by employees in any job and at any level of the organization, not just in jobs that are traditionally viewed as demanding creativity. Baher, Oldham and Cummings (2003)						
A number of attributes are associated with creativity, including divergent thinking ability, diverse expertise, and a problem-finding orientation. Elsbach & Kramer (2003)		divergent thinking, problem finding orientation, diverse expertise				
Li and Gardner offered a Chinese definition of creativity as "the solution of problems and products in a way that is initially original but is ultimately accepted in one or more cultural settings" (1993: 94) that parallels a commonly accepted Western definition of creativity as the production of novel and useful ideas for processes and products that are accepted within relevant domains. The core concept of new and practical ideas is paramount and common to creativity as it has been defined in both East and West, and so novelty and usefulness of ideas is at the center of the definition we adopted in the current study. Farmer et al. (2003)	accepted in one or more cultural settings, accepted within relevant domains, original, novelty, new, usefulness	solution of problems	Production			
Creativity is a continuous	new	new way of acting	created	reorganizatio n,		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
reorganization of our habits in our activities. "If the individual succeeds in modifying his view on the world and in re-orientating his activity a new thing is created: a new way of acting, which could be stabilized and turn itself to become an un-reflected routine". Kern (2003)				modifying, reorient		
Creativity is the imaginatively gifted recombination of known elements into something new. Creativity adds value to knowledge and progressively makes it more useful. Hence, creativity is a by-product of the knowledge economy, where knowledge is the key resource. Knowledge needs creativity. Lapierre et al. (2003)	new, useful	knowledge, imagnatively recombinatio n of known elements				
Creativity is a social process. (...).Individuals can be creative in their jobs by generating new ways to perform their work, by coming up with novel procedures or innovative ideas, and by reconfiguring known approaches into new alternatives. Thus, creativity does not have to exist only on specific types of projects; it can occur while an individual performs in various work situations. We define creativity at work an individual-level construct as an approach to work that leads to the generation	new, novel, appropriate, innovative	solution reconfigurin g known approaches into new alternatives, reconfigured	generating, coming up		social process	

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
of novel and appropriate ideas, processes, or solutions. Within the work context, the concepts of novelty and appropriateness are important (...) a minor adaptation of existing ideas so that they are reconfigured to a new application is creative, but at a relatively low level. Perry-Smith & Shalley (2003)						
Collaboration has not been the focus of creativity research for decades. This is amazing as the source of creative achievements is no longer only individuals, but more and more combinations of people (Sonnenburg 2004). Sundgren et al. (2003)			achievement		collaboration, combination of people	
While several definitions of creativity have been offered (e.g. divergent thinking as fluency - the ability to produce a large number of ideas), flexibility (the ability to produce a wide variety of ideas), originality (the production of unusual ideas) and elaboration (developing or building on other ideas) (Guilford 1967), we have chosen the definition put forth by Amabile (1996) as the development of novel ideas that are useful. Björkman (2004)	novel, useful, originality, unusual	divergent thinking	produce, production, developing, building, development	Elaboration		
Creative problem solving occurs when an individual or group	new	problem solving, new way of				

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
devises a new way of circumventing the obstacle. According to two problem solving theorists, a person's ability to form internal symbolic representations of external settings affords the opportunity to mentally manipulate and test potential solutions to a problem without having to physically enact all of them. Burroughs & Mick (2004)		circumventing the obstacle, form internal symbolic representations of external settings, solutions to problems				
According to Kirton (1976, 1987, 1988, 1994) the concept of creativity may be broken down into two dimensions. (...)The adaptor prefers to improve things within existing frameworks and existing boundaries. The innovator prefers to do things differently, restructuring problems and frameworks. Kaufmann (2004)		improve, do things differently, restructuring frameworks				
Creativity is a process that brings new knowledge, that is, previously unrelated elements of knowledge that are synthesized bring new insight through a mental process. There seem to be four sub-processes, 'layered' into each other, which connect with each other in a variety of ways. The processes are: value creation processes; scaffolding; imagination processes; materialization processes. In the creative processes the	new	brings previously unrelated elements of knowledge, synthesized, imagination, imaginative	materialization, creation	Transforms		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
imaginative is sought, that which did not exist before. Real imagination is concerned with new insights. In a creative process, imagination may be intense, but with short duration. Finally, the materialization process transforms concept into material objects. Kristensen (2004)						
Creativity has been defined as a judgment of the novelty and usefulness (or value) of something. Pirola-Merlo and Mann (2004)	judjement of novelty, usefulness, value					
Creative thinking involved breaking down and restructuring our knowledge about something in order to gain new insights into its nature. Creativity is something that occurs when we are able to organize our thoughts in such a way that readily leads to a different and even better understanding of the subject or situation that we are considering. Rickards (1985, p. 5) defines creativity as: 'the personal discovery process, partially unconscious, which leads to new and relevant insights' Rickards (1988, p. 225) also advocates a view of creativity as a universal human process resulting in the escape from assumptions, and discovery of new and meaningful perspectives or as an	new	breaking down and restructuring knowledge, organize our thought, even better understandin g, discovery, escape from assumptions, escape from mental stuckness, internal restructuring	Gain			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
'escape from mental stuckness'. In broad terms he believes creativity is to do with personal, internal restructuring. Proctor et al. (2004)						
Creativity means coming up with fresh ideas for changing products, services, and processes so as to better achieve the organization's goals. Creativity is generally defined as the production of novel, useful ideas or problem solutions. It refers to both the process of idea generation or problem solving and the actual idea or solution. (...) In his evolutionary theory of creative thinking, Simonton (1999) proposed a process of variation and selective retention (...) In a significant modification of Campbell's original ideas, Simonton suggested that variation need not be (and usually is not) blind or random. Rather, it is guided by the existence of knowledge elements that are available for combination into new variations within the creator's mind, by the extent to which the creator's mind treats those elements as relevant to the problem at hand, and by heuristic processes for combining those elements. Amabile et al. (2005)	fresh, new, novel, useful	better achieve organizational goals, knowledge, problem solving, solutions, creative thinking, changing elements of knowledge, combination of knowledge, combining	coming up, production, generation	Changing		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
Convergent thinking is seen as a single-focus activity or as 'thinking that proceeds toward . . . a single answer' (Thompson, 2003, p. 98), while divergent thinking also termed 'lateral' thinking (de Bono, 1985) is a multi-focus activity that allows for 'conflicting ideas, paradoxes, ambiguity, and doubt' (Thompson, 2003). In innovation management literature, divergent behaviour is described as being explorative; it increases complexity of a system and 'tends to follow a random or chaotic process' (...) These attributes, 'convergent' and 'divergent', can be used to describe phases in both, in the creativity process and the innovation process. In the creativity process convergence is seen to be prevailing in the preparation phase as well as in 'elaboration and evaluation'; divergence is considered the main characteristic of the incubation and insight phases. Haner (2005)		divergent thinking, convergent thinking, lateral thinking, evaluation, explorative, incubation	preparation	Elaboration		
Creativity has been described as the ability to think flexibly (considering many different approaches and categories of thought) as one of the crucial elements that can lead to novelty	novelty	think flexibly	Lead			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
in ideas. Kurtzberg et al. (2005)						
Improvisation may be close to pure "creativity"or perhaps more accurately to creative organization, the way in which we respond to and give shape to our world. The process is the same whenever we make a new arrangement of the information we have, and produce a recipe, a theory, or a poem. The difference with doing it à l'improviste, or all'improvviso, is that the attention is focused on the precise moment when things take shape. Vera and Crossan (2005)			improvisation, give shape			
Creativity has been seen as a basic skill for those whose job it is to invent and design new products, materials, or services. (...) Bourguignon (2006)		new	invent	Design		
Creativity refers to novel and socially valued products in the studied domain. Chen (2006)	novel, socially valued					
To investigate collective creativity as a distinct phenomenon that emerges in interactions, we adopt the perspective that creative solutions are built from the recombination of existing ideas (Amabile 1988, Van de Ven 1986, Weick 1979, Hargadon and Sutton 1997). Rather than focusing on those aspects of the	new, valuable	solutions, recombination of ideas, combination of ideas, confluence of old ideas	generation	collective, interactions, social interactions		

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
creative insight that represent the ex nihilo generation of new and valuable ideas, this perspective looks at how creative moments represent the confluence of old ideas. (…) Individuals may contribute discrete "old" ideas within a particular social interaction, and (…) the "creative" value of those ideas evolves through their combination confluence with others. Hargadon and Bechky (2006)						
Creativity is the ability to come up with ideas that could lead to new inventions. Ibrahim et al . (2006)	new	inventions	come up, lead			
To think is to create. There is no other creation but to create is first of all to engender "thinking" in thought. This is a 'creative' thinking one that is free from established ideas and ways of thinking. This process of 'becoming' the what might/could be the creation of what is not yet, is achieved through thinking in new, perhaps previously unimagined, modes of thinking. Jeanes (2006)		new and unimagined ways of thinking, creative thinking, think, thought, free from established ideas	create, creation, creating, becoming, achieved			
There is a tradition, going back to Schumpeter, that sees creativity in a business context as similar to groundbreaking innovations, such as the creation of new forms of organizations,	novelty, new forms of organizations, valuable, accepted, recognized as		creation		social field	

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
associated with the revolutionary role of the entrepreneur. On the other hand, there is a huge literature on creativity in organizations, which is more interested in another type of creativity performed by a type of actor that Kirton (1989) calls the "adaptor" rather than the "innovator," who is more like an entrepreneur in Schumpeter's sense. With a creativity regime, I mean those institutionalized norms that define what novelties are defined as valuable (Boden 1994; Lasswell 1959), that is, are accepted or recognized as creativity (Czikszentmihalyi 1988) within a given social field such as art, science, industry, and pedagogy. Kupferberg (2006)	creativity					
Creativity involves remote association, which is the ability to see connections between seemingly different concepts; divergent thinking, which is the tendency to present solutions that move away from established ways of doing things (Guilford, 1950; Mumford & Gustafson, 1988); and flexible thinking, which is the capacity to come up with different categories of responses to a		remote associations, ability to see connections, divergent thinking, present solutions, flexible thinking				

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
single problem (Torrance, 1974). Perry-Smith (2006)						
In the literature on organization creativity the notion of creativity is aimed at capturing what is novel, in the making, in a state of becoming. Creativity is what emerges from persistent engagement within a field. Styhre (2006)	novel, novelty		in state of becoming, making			Engagement
Creativity in the business world most often results when employees bring old ideas to new people, enacting "knowledge brokering" (Hargadon, 2002; Sutton, 2002). Sutton also designated organizations recognizing a new use for existing products as creative. Finally, Sutton also deemed products as creative when they result from new combinations of existing ideas. It is clear that in all of these instances of organizational creativity, the novelty arises from an individual's (or a group's) ability to recognize a relationship between two things that others did not recognize. Thus, when employees are demonstrating an increased sensitivity for recognizing unusual associations, they may be particularly valuable assets to help organizations improve	novelty	knowledge brokering, recognizing a new use, recognize a relationship, new combinations of existing ideas			employees bring old ideas to new people	

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
their creative performance. Ting Fong (2006)						
Creativity is the ability to produce work that is both novel and appropriate. Zackariasson et al. (2006)	novel, appropriate		Produce			
Creativity has been conceptualized as: (a) the individual personality traits that facilitate the generation of new ideas, (b) the process of generating new ideas, (c) outcomes of creative processes, and (d) environments conducive to new ideas and behaviour (Rhodes, 1961). These perspectives led to multiple definitions of creativity. For Martins and Terblanche (2003), it is the capacity to generate new and valuable ideas for products, services, processes and procedures; for Sternberg (1999), the ability to produce work that is both novel (i.e., original) and appropriate (i.e., useful); for Amabile (1996), the set of qualities of products or responses that are judged to be creative by appropriate observers. Alves et al. (2007)	novel, original, appropriate, useful, new, judged to be creative by appropriate observers, set of qualities of products		generation, generating, produce			
Creativity is popularly regarded as something genuinely spontaneous and irrational and hence, by its very definition, impossible to control. Creativity in the 'Western' tradition		spontaneus, irrational, impossibile to control, divergent, impulsive, messy				

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
from Plato to Freud and Popper has mostly been regarded as something divergent, impulsive and 'messy'. This particular perception of creativity precipitated the assumption that creativity is embodied in a particular type of personality: the individual creative genius (Bilton & Leary, 2002: 54; Boden, 1994b). DeFilippi, Grabher and Jones (2007)						
Creativity is the establishment of links between various ways of thinking. Bilton (2007)		establishment of links between various ways of thinking				
If we restrict our consideration of creativity to an initial insight and define this as the assemblage of new combinations, then what we might call generative creativity should be increased by exposure to a wide variety of ideas and components that have not already been combined. Fleming, Ming and Chen (2007)		assemblage of new combinations	generative	assemblage of new components		
Creativity is the ability to make or otherwise bring into existence something new, whether a new solution to a problem, a new method or device, or a new artistic object or form. Gil and Spiller (2007)	new	solution to a problem	bring into existence, make			
Creativity is a soft process that starts from when the problem is		imaginative process, solve			share ideas wih others	

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
brought up, including the moment when the idea to solve the problem has been born and, ends with the sharing of the idea with others. It is a soft, imaginative process. Mostert (2007)		problems				
Creativity is the tendency of employees within an individual work environment to produce novel ideas that are useful in an organization. Schepers and van den Berg (2007)	novel, useful		Produce			
Creativity': generating a novel and effective response to a heuristic problem. Winder (2007)	novel , effective	response to an heuristic problem	Generating			
Creativity involves a large number of people from different disciplines working effectively together to solve a great many problems. Catmull (2008)		solve problems			people working together	
Creativity is generally treated as a composite of novelty and utility. Creativity relates to ideas generation. Litchfield (2008)	novelty, utility		Generation			
Creativity is a process. The creative process has been described as involving several stages (Wallas, 1926), including preparation, incubation, illumination, and verification. Creativity is the extent to which the uses generated were both novel and useful. Madjar and Shalley (2008)	novel, useful	illumination, verification	generated, preparation			
Creativity is a mental	new,	mental	generation,			

Definitions	Outcome	Synthesis	Creation	Modification	Interaction	Engagement
process involving the generation of new ideas or concepts, or new associations of the creative mind between existing ideas or concepts. From a scientific point of view, the products of creative thought (sometimes referred to as divergent thought) are usually considered to have both originality and appropriateness. An alternative, more everyday conception of creativity is that it is simply the act of making something new. Wikipedia 2008	originality, appropriateness	process, new associations of creative mind, creative thoughts, divergent thoughts	making			
Creativity is marked by the ability to create, to bring into existence, to invest with a new form, to produce through imaginative skill, to make or bring into existence something new. Webster Online 2008	new	imaginative	create, make, bring into existence, produce			

Appendix 2: Inventory for Carnival of Quebec

Type	Information	Comment	File name
		PLANNING	
Interview, audiovisual	CEO (entrepreneur, Daniel Bouchard) (audio)	1st interview with Daniel Bouchard - talks about himself, his position in the company, steps for developing the carnival; what has been said last year (discussion on advantages and disadvantages of last year results); roles of employees and the after festival	Interview with Daniel Bouchard 11 Sept 2009.mp3 01:24:32 min
	CEO (entrepreneur, Daniel Bouchard) (Audio and video are identical)	Recorded (audio)	Interview with Daniel Bouchard - Quebec City 16 Oct 2009.dss 02:12:26
		Showing the atelier, employees, costumes, movable stages, etc. At this office, telling how he designs the palace (use of the software autocad)	MOV001.MOD 43:06 MOV002.MOD 08:21 MOV003.MOD 38:12 MOV004.MOD 12:25 MOV005.MOD 01:20 MOV006.MOD 18:00 MOV007.MOD 01:56 MOV008.MOD 11:12 MOV009.MOD 00:02 2:14:34
Documents, institutional	History	Book of Carnaval de Québec, La Grande Fête de l'hiver, 2003 (140 pages)	Provencher 2003 - Carnaval de Quebec.pdf
	Planning	List of daily tasks to be completed concerning the Ice Palace, updated daily on the website, 2010 (18 pages)	Choronologie 2010.pdf
		List of tasks to be done by atelier works, concerning the Ice Palace, 2010 (4 pages)	taches atelier.pdf
		Plan of Ice Palace, 2010 (18 pages)	Plan.pdf
	Marketing	Information prepared to be presented to Quebec government officials, 2010 (1 page)	Communique_bilan 2010.pdf
		Press Review about Carnaval Festival on 2009 (524 pages)	Revue de Presse 2009.pdf
		Press Review about Carnaval Festival on 2010 (544 pages)	Revue de Presse 2010.pdf
Documents, from Internet	General information	General information about Carnival (Source: Carnaval Website)(9 pages)	Quebec Winter Festival v1.doc
		General information about Ice Palace (Source: Internet in general and Carnaval Website)(11 pages)	Palace v1.doc
		General information about Parade (Source: Internet in general and Carnaval Website)(12 pages)	Parade v1.doc

DOING (Observation: photos, videos and notes)				
Day 1:	14 Videos	Preparing the field Construction plans Interaction between employees Welcome of CEO Cutting cubic ices Deliver of cubic ices Lightning up the site Preparing water and snow Building the walls Equipments on the site Checking continuously the plans Number of working days before the opening ceremony	MOV00A.MOD MOV00D.MOD MOV001.MOD MOV004.MOD MOV007.MOD MOV00B.MOD MOV00E.MOD MOV002.MOD MOV005.MOD MOV008.MOD MOV00C.MOD MOV00F.MOD MOV003.MOD MOV006.MOD	00:25 01:17 00:27 04:13 00:30 00:55 06:11 02:46 01:41 01:48 07:53 01:08 00:25 01:16 30:28
	50 Photos		D1 - 6 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 1	Diary version 19 Feb 2010.doc	
Day 2: Building	17 Videos	Constructions of walls Machine difficulties Preparing the cement of snow and water Cutting the ice cubes Complain about the weather (not cold enough) Interview of Fortier with Canoe TV (on his role, 6500 of bloc of ice, temperature, the thematic of the year, shows the construction plan, and the feeling about the palace)	MOV00A.MOD MOV00D.MOD MOV001.MOD MOV004.MOD MOV005.MOD MOV006.MOD MOV007.MOD MOV008.MOD MOV009.MOD MOV010.MOD MOV011.MOD MOV012.MOD MOV013.MOD MOV014.MOD MOV015.MOD MOV016.MOD MOV017.MOD	01:49 03:12 00:52 01:01 00:10 01:56 00:34 01:36 00:04 01:32 00:19 02:14 03:29 01:47 00:27 00:12 00:55 22:09
	17 Photos		D2 - 7 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 2	Diary version 19 Feb 2010.doc	
Day 3:	5 Videos	Construction to the 1st floor of the palace Repairing the tractors which has mechanical issue	PRG001 MOV001 MOV002 MOV003 PRG002 - MOV001 MOV002	- 00:56 00:02 09:37 - 02:11 02:56 15:42
	47 Photos		D3 - 8 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 3	Diary version 19 Feb 2010.doc	

Day 4:	18 Video	Towers have been constructed Weather too cold – the water is frozen everywhere Mechanical issue with the tractors Having lunch with construction workers Talking with Ben : Chief of Mechanist of the site Talking with Martin the site manager Checking the balance of the tower Martin talking with Walki-Talkie Use of walki-talkie extensively Daniel explains the wireless system that they use Daniel talks about Ipod and Iphone system Arrival of Electrical Cabine for the Palace	PRG001 - MOV00A MOV00C MOV00D MOV00E MOV00F MOV001 MOV002 MOV004 MOV005 MOV007 MOV008 MOV009 MOV010 PRG002 - MOV001 MOV002 MOV003 MOV004 MOV005	- 01:59 15:12 00:26 04:05 02:22 01:30 02:00 03:10 01:01 17:43 00:23 02:14 03:24 - 20:39 04:58 06:54 06:42 05:15 1:39:57
	17 Photos		D4 - 13 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 4	Diary version 19 Feb 2010.doc	
Day 5:	6 Videos	Electrical cabin Arrival and installation Daniel and Martin : Change of construction plan The issue of temperature Problem of using walki-talkie and the misunderstanding of channels	PRG001 - MOV001 MOV002 MOV003 MOV004 MOV005 PRG002 - MOV001	- 00:20 08:01 35:34 00:34 14:39 - 05:28 1:04:36
	15 Photos		D5 - 14 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 5	Diary version 19 Feb 2010.doc	
Day 6:	9 Videos	Discussion of misunderstanding while using the walki-talki technology Temperature issue Big tent is coming from Ville de Bainville Talking about next scheduling	PRG001 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV006 MOV007 PRG002 - MOV001 MOV002	- 00:26 04:28 02:45 01:36 00:25 24:19 06:25 - 02:23 05:03 47:50
	16 Photos		D6 - 15 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 6	Diary version 19 Feb 2010.doc	
Day 7:	17 Videos	Artists asking for ice cubes Daniel talking to visitors	PRG001 - MOV00A	- 11:35

		Palace is almost finished Preparing the museum inside of Palace Constructing the small glissade next to the palace Student sculpture Interview with Daniel Agenda from the data base Verification of museum plan Discussion of Daniel and Fortier on the construction of glissade and the planning of it	MOV00B MOV001 MOV002 MOV003 MOV004 MOV005 MOV007 MOV008 MOV009 PRG002 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV006 MOV007	05:01 00:26 03:00 00:47 04:30 11:03 10:22 07:00 05:39 - 06:14 02:55 11:38 01:42 01:42 06:10 01:42 1:31:26
	13 Photos		D7 - 20 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 7	Diary version 19 Feb 2010.doc	
Day 8:	7 Videos	Schedule issue (planned timing, occurred timing and production timing) Coordination between new employees for each event Importance of scheduling given by Fortier	PRG001 - MOV001 MOV002 MOV003 PRG002 - MOV001 MOV002 MOV003 MOV004	- 19:21 13:45 07:16 - 06:11 01:07 17:28 14:54 1:20:02
	Photo		D8 - 21 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 8	Diary version 19 Feb 2010.doc	
Day 9:	8 Videos	Stage installation Installation of lighting system Discussion on what to put and why, even when the plan was discussed earlier Daniel's concerns on the timing Security measurements for the entrance on the site	PRG001 - MOV001 MOV002 MOV006 MOV007 MOV008 MOV009 PRG002 - MOV001 MOV002	- 02:43 07:27 10:30 01:30 14:43 19:55 - 11:40 02:34 1:11:02
	6 Photos		D9 - 22 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 9	Diary version 19 Feb 2010.doc	
Day 10:	19 Videos	Bad temperature – rain Electrical installation and the problem of rain Time issue and temperature (behind schedule)	PRG001 - MOV001 MOV003 MOV005 MOV007	- 00:37 01:04 21:23 06:45

		Arrival of trailer – programming for the lighting system Stop of rain – group back to work	MOV002 MOV004 MOV006 MOV008 PRG002 - MOV00A MOV001 MOV003 MOV005 MOV007 MOV009 MOV00B MOV002 MOV004 MOV006 MOV008	00:30 04:32 02:29 04:37 - 01:25 04:12 02:06 00:23 00:44 03:03 05:30 00:54 00:27 01:12 03:50 1:05:43
	39 Photos		D10 - 27 Jan 2010 Diary version 19 Feb 2010.doc	
	Notes	Description of observations related to each video of day 10	Diary version 19 Feb 2010.doc	
Day 11:	25 Videos	Sculpture company started their work Disney Inc. has arrived for the Abaraham Palance Daniel giving explanation to visitors Sounding system installation Installation of Regie de Sound, and Regie de Musique Programming the lighting system – testing of it Martin putting pressure to finish the last part of carnival Light programmer and the testing	PRG001- MOV00A MOV00C MOV00E MOV001 MOV003 MOV005 MOV007 MOV009 MOV00B MOV00D MOV00F MOV002 MOV004 MOV006 MOV008 MOV010 PRG002 - MOV00A MOV00B MOV001 MOV002 MOV003 MOV004 MOV006 MOV008 MOV009	- 12:14 27:42 21:39 08:59 02:29 03:46 00:58 02:44 06:41 01:59 04:34 01:46 01:11 02:41 01:13 00:25 - 00:18 00:25 01:28 03:36 10:22 03:09 00:57 16:46 00:39 2:18:41
	89 Photos		D11 - 28 Jan 2010 Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 11	Diary version 19 Feb 2010.doc	
Day 12:	34 Videos	Started student sculpture 6h before the start of carnival – Daniel moving here and there	PRG001 - MOV001 MOV003	- 00:40 01:25

		Testing the musical instruments	MOV004	02:45
		Opening ceremony of carnival	MOV005	12:49
		(joyful event)	MOV006	07:16
		Cell phone not working and people	PRG002 -	-
		are not happy	MOV00A	04:46
			MOV00B	02:08
			MOV00C	02:06
			MOV00D	12:05
			MOV00E	05:39
			MOV00F	10:18
			MOV001	01:38
			MOV01A	00:37
			MOV01B	00:49
			MOV01C	04:14
			MOV01D	01:47
			MOV01E	03:41
			MOV01F	00:59
			MOV003	03:20
			MOV005	03:36
			MOV006	03:06
			MOV007	01:40
			MOV008	04:38
			MOV009	02:14
			MOV011	04:53
			MOV012	04:17
			MOV013	12:03
			MOV014	17:20
			MOV015	13:39
			MOV016	04:30
			MOV017	10:26
			MOV018	07:17
			MOV019	10:04
			MOV020	01:35
				4:39:59
	3 Photos		D12 - 29 Jan 2010 Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 12	Diary version 19 Feb 2010.doc	
Day 13:	17 Videos	1st day of carnival	PRG001 -	-
		Visitors coming to the carnival	MOV001	00:20
		Ben preparing the CDs and DJs	MOV002	01:36
		Asking the organizing committee	MOV003	01:11
		about their impression on the carnival	MOV004	02:22
		start up	MOV005	14:03
		Coordination between volunteers and	MOV006	11:17
		employees	MOV007	01:31
		Sound system: how it works and it is	MOV008	09:28
		operated during the carnival	PRG002 -	-
		Youtube and Carnival	MOV00A	08:53
			MOV001	03:46
			MOV003	07:43
			MOV004	07:42
			MOV005	02:11
			MOV006	00:37
			MOV007	00:37
			MOV008	02:30
			MOV009	01:20

				1:16:30
	Note	Description of observations related to each video of day 13	Diary version 19 Feb 2010.doc	
Day 14:	2 Videos	Martin talks about visitors And the visitors of the carnival Arrival of bonhomme de Carnival	MOV001 MOV002	00:27 17:44 18:11
	Note	Description of observations related to each video of day 14	Diary version 19 Feb 2010.doc	
Day 15:	3 Videos	Entrance to the palace premises Martin talking about his satisfaction on the work/salary and the "sentiment d'appartenance"	PRG001 - MOV001 MOV002 MOV003	- 18:51 14:31 09:41 18:11
	7 Photos		D15 - 4 Feb 2010 Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 15	Diary version 19 Feb 2010.doc	
Day 16:	17 Videos	Preparation of the show for tonight Back-stage preparation Coordination Sound checking for the show Director of programming comes and explains the new changes of the program for tomorrow	PRG001 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV006 MOV007 MOV008 PRG002 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV006 MOV007 MOV008 MOV009	- 02:25 01:31 03:29 05:14 02:31 03:42 01:45 00:52 - 01:04 01:39 00:11 00:15 00:13 00:12 01:07 07:46 05:15 39:11
	Note	Description of observations related to each video of day 16	Diary version 19 Feb 2010.doc	
Day 17:	3 Videos	Daniel and Jeremie: Doing the bilan of the year	PRG001- MOV001 MOV002 MOV003	- 02:52 07:59 20:15 31:06
	2 Photos		Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 17	Diary version 19 Feb 2010.doc	
Day 18:	6 Videos	Press conference Preparation for the press conference	MOV001 MOV002 MOV003 MOV004 MOV005 MOV006	01:57 00:26 00:53 04:23 00:45 13:20 21:44
	Note	Description of observations related to each video of day 18	Diary version 19 Feb 2010.doc	

Day 19:	15 Videos	Destruction of Palace Electronic parts to take out Taking out Lightening system Destructing the sculptures	PRG001 - MOV001 MOV002 MOV003 MOV004 PRG002 - MOV00A MOV00B MOV00C MOV001 MOV002 MOV004 MOV005 MOV006 MOV007 MOV008 MOV009	- 01:02 10:55 14:22 04:16 - 00:43 03:15 03:06 10:05 02:02 02:47 00:57 01:03 09:46 00:49 05:42 1:05:50
	104 Photos	Site building, restaurant (Gathering)	D19 - 15 Feb 2010 Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 19	Diary version 19 Feb 2010.doc	
Day 20:	16 Videos	Cleaning the sculpture section Deconstruction of the palace Taking away of chemical restrooms Destroying the remaining walls of palace	PRG001 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV006 MOV008 MOV009 PRG002 - MOV001 MOV002 MOV003 MOV005 MOV006 MOV007 MOV008 MOV009	- 02:20 01:19 05:48 00:14 00:28 05:10 00:41 00:11 - 00:31 04:46 01:02 06:43 01:06 01:38 05:45 00:30 38:12
	35 Photos		Diary version 19 Feb 2010.doc D20 - 16 Feb 2010	
	Note	Description of observations related to each video of day 20	Diary version 19 Feb 2010.doc	
Day 21:	9 Videos	Demolition day Emotional day Managing where to dump the ice It is a familial gathering on the site Daniel : 3 weeks to build and 30 minutes to demolish ! He is happy that is it done. He says: On pense au futur!	PRG001 - MOV001 MOV002 MOV003 MOV004 MOV005 MOV007 MOV008 MOV009 PRG002 - MOV001	- 11:01 01:20 00:59 05:22 05:39 00:55 01:18 12:35 05:31

				44:40
	51 Photos		D21 - 17 Feb 2010 Diary version 19 Feb 2010.doc	
	Note	Description of observations related to each video of day 21	Diary version 19 Feb 2010.doc	
Observation	Notes	Total amount of pages: 116 pages		

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